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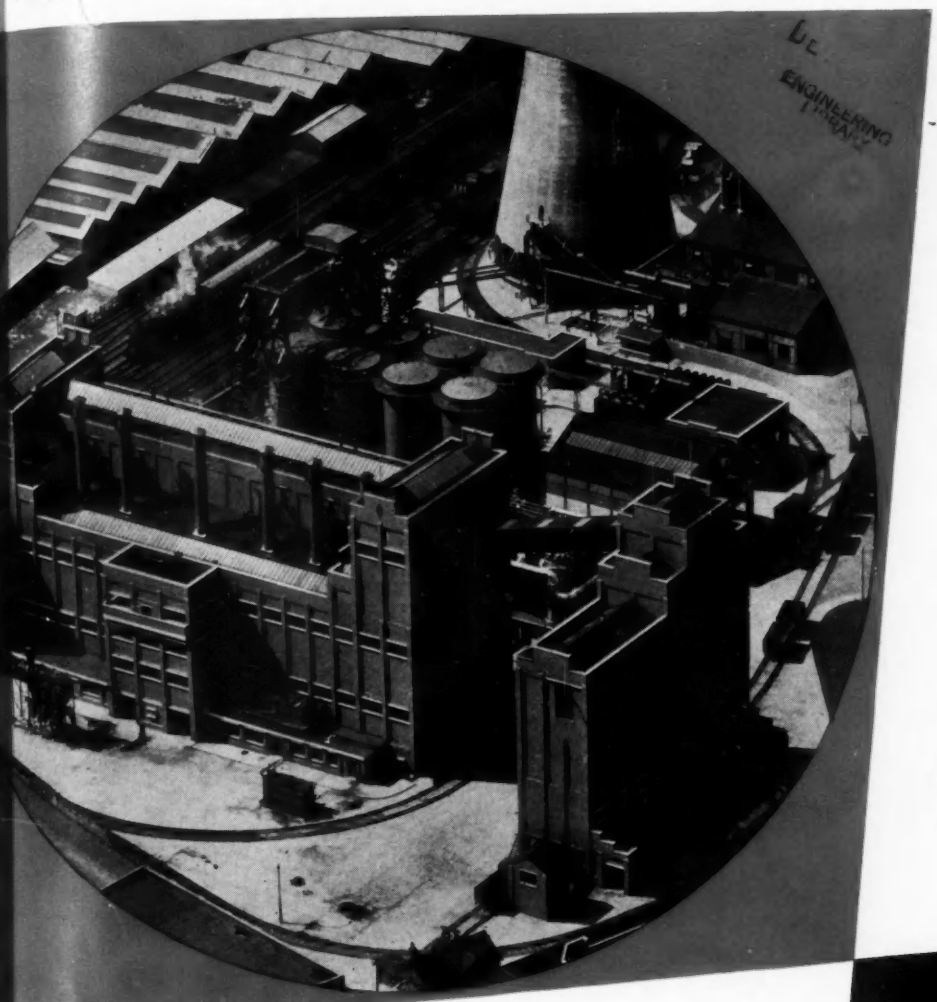

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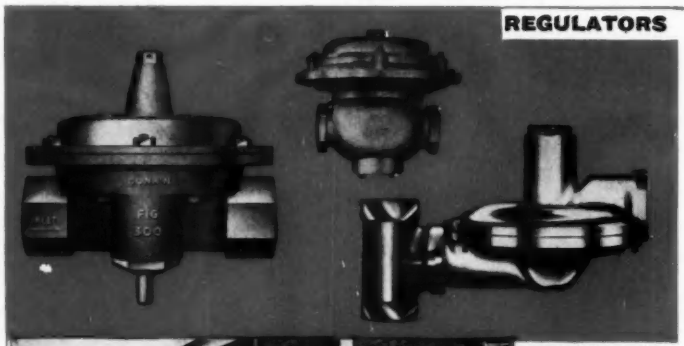
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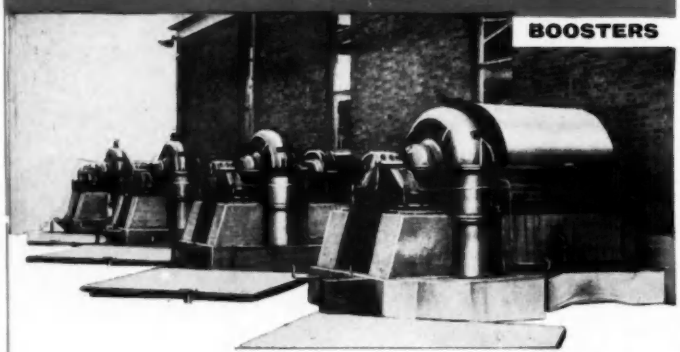
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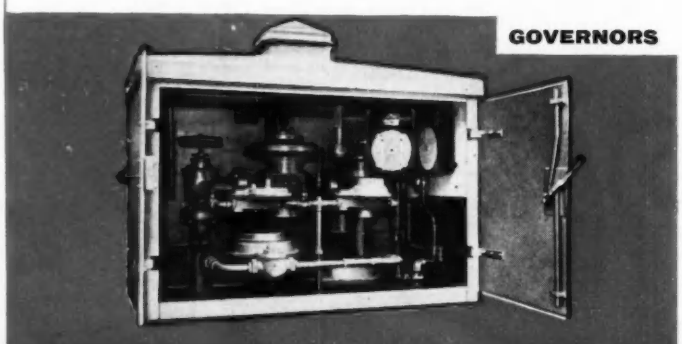
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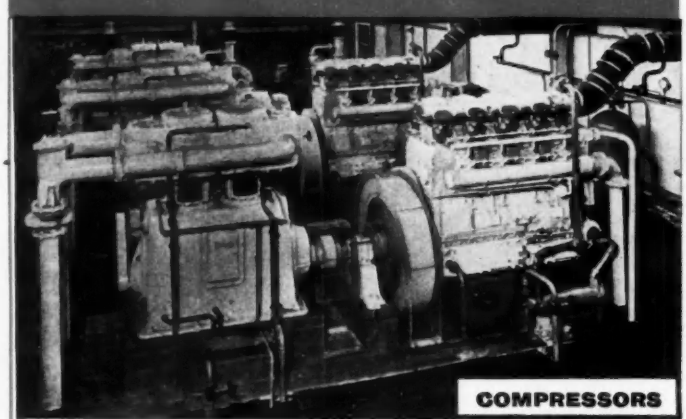
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Gas Journal

VOLUME 304 • NUMBER 5074 • 112th YEAR

WEDNESDAY NOVEMBER 30, 1960

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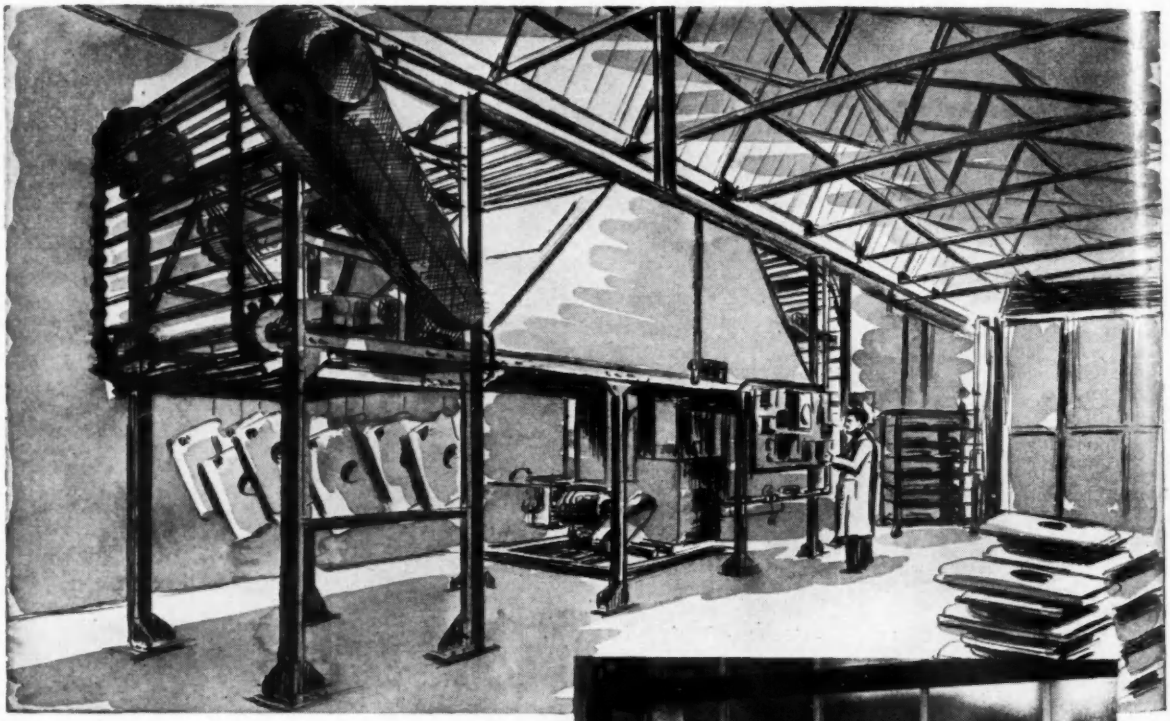

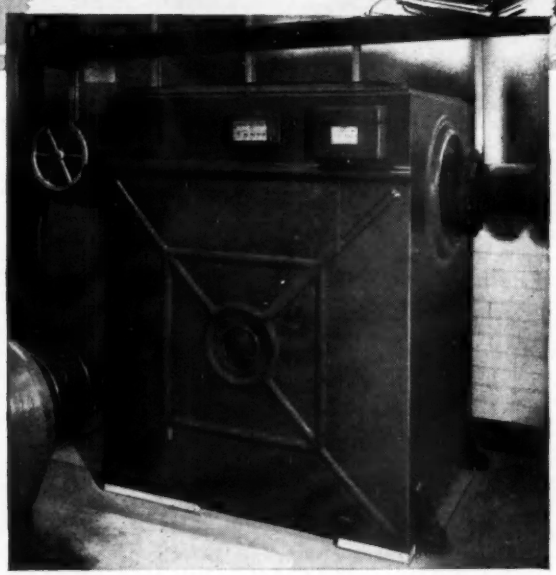

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Gas Journal

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The gas supply pattern in 25 years

WOULD that we could accurately prophesy the state of the fuel industries in 25 years' time; how very much simpler it would make the gas industry's present plans for developing new types of plant for the manufacture of refined fuels! That we cannot do so should not deter us from trying very hard to make an accurate guess as to what is likely to be the demand for processed fuels in the mid 1980's, and especially the rôle to be played by the gas industry in their supply. Current trends are a useful guide in any such exercise and we were particularly pleased to read the paper by Professor M. W. Thring and Dr. C. Hulse, both of Sheffield University, presented to the recent Autumn Research Meeting, on this subject as it affected the gas industry.

As it happened there was little in this paper which we did not already know, but it had the merit of putting the information before us clearly and concisely.

The discussion which followed was of the greatest possible interest and confirmed our views about some of the problems to be faced in the development of the new gas-making processes and their immediate application in the near future by our leading engineers and technologists.

All are agreed that some process of gasification must be perfected for gasmaking on the grand scale, if the industry is really to be able to meet the competition from oil on equal terms. The Lurgi process is with us and it would seem that it is going to stay. Coal hydrogenation has strong claims potentially as a better process, but it has not yet reached that stage of development at which its complete success can be assured, nor does it yet appear capable of manufacturing so cheap a therm.

The importance which can be attached to these two authors advocating gasification and a return to coal as a raw material for the industry, is the possible effect it will have on the coal industry rather than on the gas industry.

On more than one occasion we have suggested that the real future of the coal industry lies in some form of gaseous fuel. The rôle of the gas industry in the past, as now, has been to supply to the public at large a fuel of medium calorific value, conforming to certain strict standards of purity. Town gas has a definite specification, as accepted by the individual area board.

However, the feeling appears to be growing among those outside the gas industry that manufacturing industry making use of large quantities of heat would welcome some form of 'industrial' gas which might not necessarily conform to the town gas specification. Provided the properties of such a gas are uniform and the industrialist knows what they are, he can adjust his plant to suit. If such a gas should become available, who would supply it? Would it become the responsibility of the local gas board or would some enterprising industrialist in a heavily industrialised part of the country be able to provide it for his colleagues? Whoever would provide it, in any integrated system of nation-wide gas supply, such a conception would need two national grid systems, an 'industrial' gas network and a 'town' gas network. Though we still feel this would complicate the overall system, especially if some other body was to supply the industrial gas, it has the advantage of bringing back once more both the importance and potentialities of coal as a basis for industrial heating, providing of course that the thermal efficiency of the 'industrial' gas supply is sufficiently high to be economic.

Since the future of coal is so intimately bound up with this conception, we would like to recall the conference of the National Union of Mineworkers held earlier this year, at which papers were read by Mr. E. F. Schumacher, Economic Adviser to the National Coal Board, Mr. S. Kessler, Economic Research Officer to the Union, and Dr. D. T. A. Townend, Director-General of B.C.U.R.A. In fact Dr. Townend referred to the conference in a contribution to an earlier paper at the Autumn Meeting.

At this conference, the theme of which was 'Britain's Coal,' the relative availabilities of coal and oil were discussed, and it was significant that in the discussion on Mr. Schumacher's paper, 'The Next Fifty Years,' no-one questioned his main propositions. Sir Geoffrey Crowther, from the Chair, did indeed suggest that the argument contained the paradox 'that the best way of preserving the nation's coal was to use it.' But Mr. Schumacher's contention was rather that while there was a 'natural rate' at which the coal industry could contract, the consequences might be disastrous. 'The coal industry is not a manufacturing industry—it could not be turned off and on like a tap.' There was danger

in the heedless substitution of oil for coal, although oil would have to carry 'the main expansion of fuel requirements in this country.'

Mr. Kessler suggested that 'the gas industry should be encouraged to use more coal.' Should it not rather be encouraged to turn more of the coal it does use into gas—which after all is the object of complete gasification? Such a policy might very well result, initially, in a reduction in the gross amount of coal used, with an ultimate increase as the use of gas expanded. And the Lurgi or other new processes need not be the only means to this end. Mr. S. K. Hawthorn, of the West Midlands Board, has shown how combinations of the well-tried processes of carbonisation and the water-gas reaction can be used not only to gasify the whole of the coal but to ease the transition from a mixture of gas and solid smokeless fuel to all-gas, and that without increase in the price of either to the consumer. As Dr. Idris Jones put it, 'We should do everything possible to make coal a better fuel either *per se* or by conversion into a fuel of higher efficiency.'

Dr. Jones went on to call for the extended use of coal in the production of chemicals. But Dr. Townend thought expansion in this direction would be severely limited. Even if coal was able to supply all the organic chemicals used in the United Kingdom, the coal involved was never likely to reach a figure of great significance. It was fairly unanimously agreed, too, that oil from coal was not likely to become an economic proposition in the near future.

On the other hand there was general agreement that, as Sir Christopher Hinton put it: 'People are demanding more and more fuels that can be delivered to them through pipes,' and in that he included oil, gas and electricity.

Taken all round, there seems to be a good case for an increased use for gas, and the Lurgi type of plant appears as the best means of making it. With a calorific value of about 400 B.t.u. per cu.ft., Lurgi gas could be suitably piped to industrial centres and even to local distribution centres at which it could be enriched by butane or imported liquefied natural gas to town gas standards. Some such means would reduce the price of gas to industry and would only require the enrichment of the minimum quantity for domestic and commercial consumers.

Commentary on the news

Central heating advertising

WITH its sights firmly fixed on the target of central heating business, the gas industry has become a significant participant in the advertising war which is an important ingredient of the commercial struggle for success in this market. Accepting the fact, not without reluctance, that gas cannot compete with oil in terms of advertising expenditure, increasing importance attaches to the quality of layout and copy. And here gas—meaning the Gas Council—has received a pat on the back from 'a woman agency executive' who contributed a most interesting article to the November 18 issue of *Advertisers' Weekly*.

Generally speaking, the author considers that central heating advertising is a 'dismal show' and finds 'no evidence anywhere of a genuine sympathy for, or understanding of, the blessings of healthfully warm homes.' She points out that although the subject of the advertising is *warmth*, there is little warmth in most of the headlines employed, while in many cases the illustrations could relate to advertisements for carpets, perfume, aspirin, wall paint or detergent—anything in fact except fuel.

She calls for 'emotional advertising,' aspects of which should be the powerful pro and con feelings about central heating, the sensation of the comfort of warmth itself, and the desire to care for the health and welfare of children. She believes that for many people mention of central heating suggests an unpleasant image compounded of stuffiness and over-heating; these antagonistic attitudes must be overcome with subtlety.

In the opinion of the author, 'the Gas Council has come closest to finding the ideal advertising approach,' but the example she favours is not for central heating but for room heaters. Never mind, she goes into raptures over the phrase 'wrap-around-warmth' which obviously conjures up for her all the images its creators intended.

An interesting point is the writer's belief that a lot of the mistakes of the heating advertisers are due to their own emotional feelings about open fireplaces. 'They seem to start with the basic assumption that central heating is an alternative, a substitute, for the open hearth. Therefore, they avoid at all costs anything that might suggest the same appeal as an open fire. . . . Let our central heating manufacturers not deny their potential market the joys of the open fire! Let them sell instead the healthful, comfortable, relaxing satisfaction of a warm house plus the visual contentment of the fireplace.'

As an industry we are rather huffy about the joys of the open fire, but we should perhaps be a little more tolerant if we were to get the basic central heating load. And of course we *do* sell room heaters. Perhaps we should give more thought to the room heater as a complement to central heating.

Lost opportunity

EXPERIENCE of the National Housing and Town Planning Conference held at Brighton last month leads us to wonder whether gas boards' handling of such an important event is best calculated to achieve the results desired.

This is a national conference, attended by the chairmen of housing committees, most of whom are accompanied by their engineer or surveyor. These are the very men gas board special representatives are always trying to meet. Why then are boards so often represented only by their most senior officers? This is a heaven-sent opportunity for the people whose job it is to deal with housing managers and surveyors to meet them in different, less formal, surroundings. The expense of arranging for their attendance, plus adequate expenses, would be nothing compared with the benefits which would accrue. Heavy attendance by the board in whose area the conference happens to be held does not fill the bill.

The 1960 conference had an excellent exhibition at which the Gas Council was strongly represented, but where, oh where were the *men*?

More from the 26th Autumn Research Meeting

The next 25 years . . .

Presentation and discussion of paper: 'Some Considerations of Gas Making in Terms of National Fuel Situation for the Next 25 years' by Professor M. W. THRING (Professor of Fuel Technology and Chemical Engineering) and Dr. C. HULSE (Senior Lecturer, Department of Fuel Technology and Chemical Engineering), University of Sheffield.

DR. C. HULSE, in presenting the paper, said: I should like to apologise for Professor Thring's absence, since he is in America, but I will do my best to put over our points of view on this question of the future as we see it of the gas industry.

Town gas can be manufactured from either of the main hydrocarbon fuels, coal and oil. It is very proper that we should regard the manufacture of gas from certain oil products as a good thing. Oil fuels will always be required for certain purposes, and this inevitably will lead to the production of materials which may not be capable of direct use. Conversion to a gas capable of distribution as town gas, is obviously, from the standpoint of overall fuel economy, a good thing. At the moment, for limited application, oil-based gas is as cheap as, if not cheaper than, gas produced from coal. As oil is not indigenous, however, and for a variety of reasons, some of which are mentioned in the paper, one would not feel altogether happy if coal came to be displaced as the principal source of heat and power in this country. For this purpose we can, perhaps, rule out atomic energy to a large extent, and for many years to come we shall still have to rely largely on conventional fuels for our heat and power.

The snag with regard to conventional gasification methods is that large quantities of coke are produced. Total gasification would seem to be the answer to this problem. Total gasification is not a new process. For many years we have produced gas yielding a calorific value of something like 165 to 170 B.t.u. per cu.ft., but this would not generally be considered suitable for general distribution. Recently, the Lurgi process has given us an intermediate gas so far as calorific value is concerned, which is capable of enrichment by the addition of a high calorific value material, generally based on oil at the moment.

There are certain disadvantages of the Lurgi process. The steam consumption is large, and quite a large proportion of the steam supplied is unreactive. The answer to this problem might, of course, be the slagging gasifier. Work is proceeding apace at Solihull and B.C.U.R.A. on some of these problems.

Provided that enough funds are made available, we can look for other possible processes. Some are mentioned in the paper, notably the proposals of Dr. Dent for hydrogenation.

One proposal has to do with the possible further development of the slagging gasifier. One of the disadvantages which might be quoted against it is the sensible heat which is lost in the slag. This might be a particular disadvantage if low-grade high-ash coals are being gasified. It might be possible to combine the slagging process with the manufacture of a small quantity of iron from iron ore. In Germany, Wenzie has smelted iron ore in a low shaft blast furnace charged with coal and not coke.

Naturally, the gas produced in this air-blow system was of very low calorific value, but it seems to us that if oxygen blowing were used, or at any rate considerable oxygen enrichment, it might be practicable to produce a gas of sufficiently high calorific value and at the same time a little iron as a by-product. The all-important goal of the gas industry at the moment should be the production of cheap distributable gas. If a by-product such as iron could be produced without adversely affecting the qualities of the gas, then the economic advantage might make it possible to bring down the price of gas still further.

One final point. In the paper we raise this question of the water gas shift reaction in which carbon monoxide is converted to hydrogen. At the moment the policy seems to be that future gasification plants should operate this reaction in order to reduce the toxicity of town gas. However, the cost of this process seems to us to be a great stumbling block. The Wilson Report suggests that the cost is of the order of 1.8d. per therm. We wonder whether the saving of life, or at least the certainty of saving life, would justify the cost, and should not other

possible means of getting over this difficulty be further examined?

Possibly the industry is a little over sensitive. If one looks at the accidental deaths due to inhalation of town gas in the context of other sources of accident in the home and in industry, then gas will probably appear in a very good light. Is it not possible that a safety device, such as automatic ignition, automatic detection of the presence of town gas arranged to close a main supply valve, might be cheaper than the complete removal of carbon monoxide?

Mr. D. E. Rooke, Gas Council: Throughout the paper, many references are made to the work of the Committee on Coal Derivatives whose report was published last August. Among the conclusions of this Committee one finds the following words: 'Within the field of our enquiry town gas offers the greatest scope for expansion, but to make this possible new plants will have to make gas more cheaply than existing ones.' This is both encouraging and at the same time challenging. It offers hope for the future, but conditional upon the achievement by the industry of certain research and development objectives.

Raw materials

The authors have called attention to the fact that the industry draws its raw materials, coal and oil, from its competitors. Furthermore, these substances which are raw materials to our industry are, in fact, the finished products of our competitors, and this is an important point. Town gas is a premium fuel and we cannot expect it to compete for those heat services where its unique properties cannot command a premium. If a supply of bulk heat is required and the sulphur content of the fuel is of no consequence, then clearly town gas made from fuel oil cannot compete with the fuel oil itself.

Particularly in the domestic field convenience to the customer can command a premium, but the size of this premium is at present in some doubt. That the sales of gas have not expanded in recent years like those of electricity and oil products have been mentioned, and the authors have quoted again from the Wilson Report in saying that it is the opinion of the Gas Council that the total cost of manufacture of gas should not exceed 10d. per therm, inclusive of capital charges. This statement of the Council's opinion appears in the detailed conclusions at the end of the Report, but I would draw attention to the original statement of the Council's opinion which appears in paragraph 45 of the Report. Here it will be seen that although an upper limit of 10d. per therm including capital charges was mentioned, the Council also said that the cost of manufacture should preferably be substantially less than this if the period of static gas sales was to be ended, and the figure of 10d. cannot be taken as the real target at which to aim.

Dealing with the possibility of departing from the present standards of town gas, the authors give their opinion that the industry should be prepared to face the prospect of changing jet sizes of existing appliances if non-standard gases could be produced very cheaply. This prospect is certainly not preventing the industry from giving thought to the production of non-standard gases and has already been faced from time to time in the life of the industry. However, the departure from 'normality' that can be accommodated in this way is somewhat limited and some gases might require radical changes in the combustion chamber design of many domestic appliances, particularly water heaters. Incidentally, the estimate of £10 per consumer given in the Wilson Report was an attempt to illustrate the cost of such a radical change in the gas type.

Turning now to the more detailed consideration of the Lurgi process and particularly the study of a Lurgi plant sited at the pithead, I am sorry to see that the authors cast doubt upon the commercial wisdom of reducing the carbon monoxide content of the gases distributed. Of course, more can be done and, in fact, is being done to make appliances safer and so reduce the risk of accidental gassing, but in my opinion this is not a field in which the industry can refrain from making advances merely because they increase the cost of the final gas.

First, the saving of 1.8d. quoted is per therm of purified lean gas and would be less per therm of final gas. Secondly, assuming that the calorific value and specific gravity of the final town gas are to remain unchanged, it will be necessary to remove very nearly the same weight of carbon dioxide from the unshifted Lurgi gas in order to meet the specific gravity limitation. Since the final carbon dioxide content would have to be much lower than in the quoted gas, the total cost of CO_2 removal could be taken as about equal in both cases, and thus the saving which would accrue would be much reduced. If the specific gravity were not to be held constant, then I estimate that a gas of 500 B.t.u. per cu.ft. of comparable gravity to the CO rich town gas could be produced at identical cost by the addition of nitrogen/butane mixture to the standard final gas.

The development of slagging gasifiers received much attention from the Wilson Committee, who felt that it represented a most important aim of research. The Gas Council fully accepts this point and will continue to conduct research to this end, although the economics of the process are not obviously advantageous. For general use the high carbon monoxide content gas arising from such a gasifier cannot be distributed without shift conversion although the possibility of using such gas for industrial purposes remains. So, too, remains the possibility of coupling this process to that of iron production, but my personal opinion is that the engineering difficulties of slagging gasification in oxygen and under pressure for town gas production are such that the effort should first be concentrated on the simpler objective until an appreciable measure of success has been achieved. Once a fully satisfactory pilot slagging gasifier is available a number of possibilities for integration can be investigated on a practical scale.

Possible processes

The industry is not short of possible processes at the present time, but is certainly not able at this moment to deploy one which is the obvious answer to all difficulties. That most of the processes available were originally developed abroad is surely a reflection of the fact that the carbonisation technique has remained economic for longer in the United Kingdom than in many areas abroad, particularly those where sources of natural gas and cheap oil products suddenly erupted to disturb the balance of the fuel economy. But the authors must not be allowed to

suggest that all new processes are of foreign origin. For example, basic experimental work for the Segas process was not only performed in this country but the technique grew to full industrial scale here. That it found its most numerous applications abroad is only one of the problems to be faced by the prophet at home.

Mr. L. W. Andrew, Watson House: On [p. 1] there is a rather sweeping statement, '. . . it is apparent that everwhere coal is cheapest and gas more expensive than oil.' I do not believe that at present that represents a fair overall statement of the present position. Quite clearly, one must look for a reason for such a discrepancy. I think that what has really happened is that the information on which the paper is based is not completely up to date. I do not think that it fully takes into account the latest appliances and the latest tariffs which are available. There is a great danger of our being hypnotised by surveys carried out in the past—excellent surveys, but surveys which did not take into account the very latest developments.

'Useful' therms

There is also a danger of our being hypnotised by a mysterious word 'useful' therms. What really matters is the actual service given to a user and what the user will pay for it, and it is the flexibility of gas, which it is so difficult to put down on paper, which makes such a very real difference in practice.

With the present prices of gas that we have we might well look at two types of heat service. There is the one which is the major heat service, in which the total cost of running, capital and maintenance, is of very great importance, and then there are the smaller services in which marginal running cost differences are unimportant. To quote specific examples of living room heating, there are an awful lot of open coal fires, and it is true at the moment that the modern high efficiency convector fire, properly installed, can replace an open coal fire in practically every part of the country without any increase in running cost. Selective warm air heating, which is modern, has given a service which is completely acceptable to the user and is economic in its use.

On the central heating side, the running cost is a little more difficult, but here it has been shown that if one takes capital, maintenance and running costs into account, then the position is sufficiently competitive for gas central heating to be very popular. On water heating, we have the interesting position that the difference between the provision of what a person really needs and wants and what he may be forced to get with, say, a central service, and it would be wrong to say that gas is not competitive with electricity at present prices at the sort of level of what water usage many people want—possibly 150 or 140 gal. per week.

I think we should remember that on such appliances as cooking, refrigeration, drying and incineration, for which there is no alternative fuel, a marginal difference in running cost is neither one way or another. It is the service that matters.

I feel strongly that at this stage of our work statements of that sort should be made. I think it is probably right to say that the evidence for these statements is based on practical experience on the district. For example, the Gas Council laid on with the Boards field trials in something like 120 houses in which there was a direct comparison of a high proportion of solid fuel, little solid fuel, and all gas. Those results have not yet been published. They have been analysed, and I hope they will be published soon; and they show that the all-gas installation over all the 12 boards was competitive with those including a high proportion of solid fuel. There are instrumented houses and flats at Headstone Lane and West Ham and Gateshead the results of which have been given to the Institution, and I hope that many of you were present at the paper that was given to the Public Works Congress recently in which the figures were released for the flats and houses at Harlow, in which the use of gas for instantaneous water heating and warm air heating came out very competitively to the users.

One cannot leave the statement that even at the moment gas is more expensive than oil or solid fuel. That immediately raises the difficult question, why in that case is not the consumption rocketing? The answer is partly that we have only recently fully appreciated our own strength. It is only recently that we have felt the impact of newer plants and improved methods of installation. One can prove this by the resurgence of selling and popularity which has taken place over the last year. There are real indications that there is a change, and Sir Henry Jones has mentioned earlier a 4% rise in gas consumption since last April.

With regard to sensitivity to toxicity, I would only say that we are too sensitive—and thank God that we are. This is a question not of sensitivity but of responsibility.

Automatic ignition is a means. It has absolute priority. Since 1959, for example, it has been mandatory on hot plates of all cookers. The right approach is to set ourselves a target, remembering that with a refined fuel it is not necessarily cost that is the only factor, but one must look for the best possible service. Our target is there, our sights are set high, so that looking ahead we are thinking in terms of low carbon monoxide, low sulphur, and absolute consistency of the product we sell.

Two anomalies

Mr. L. J. Clark, North Thames Gas Board: At an early point in the paper, reference is made to two anomalies in the gas industry; first, the fact it is a dual fuel industry, and secondly, that it buys its raw materials from its competitors. I would suggest that there is a third one, and an important one; and that is that the gas industry is dispensable, whereas the other industries, particularly electricity and oil, are indispensable. Oil has a complete monopoly so far as automotive fuel is concerned, and electricity has a complete monopoly in certain uses for power production, and so on. Gas can only hold its place on the basis of true economic supply of heat and on the service and quality of its product.

With regard to sulphur, I think that all of us are giving more attention to sulphur these days. In 1957, the total sulphur in the Board's gas was 17.9 grains per 100 cu.ft. In the following year it was 15.8, and in the next year 13.9 grains per 100 cu.ft. In the year up to March, 1960, it was 11.4 grains. The present indications are that we may

get somewhere near a target of 10 within the foreseeable future. That is something that has been done on existing plant by altering that plant in a particular way.

With regard to carbon monoxide, a lot has been said so far on this question, and we should not be carried away too far by the suggestion that it is a very expensive operation. This depends upon the gas producing process that precedes it. We have examined certain cases where the cost of carbon monoxide removal can be below ¼d. a therm, especially when you are producing a light gas which makes it unnecessary to remove the carbon dioxide. I think that we should set the target there for improving quality.

The authors refer to problems of the coke sales for the gas industry as it exists at present, and they point to the very much more satisfactory progress made by specialist fuels. The point to keep in mind here is that the specialist smokeless fuels only represent some 10 to 15% of coke production. Surely if you are working in a small marginal market of that sort you will have no difficulty in selling the material. The gas industry is now following the example set by others and is making the specialist cokes itself and finding that they are selling extremely well.

Bold picture

The authors refer to problems of the coke sales for the future prospects of the industry. They have reviewed the various methods that we have available for producing gas at an economic price. I think that we are now beginning to know them all. The production of gas from coal at the pithead—where we see that it can be done at quite favourable costs—the production of gas from oil and its products, and even the importation of liquid natural gas to strategic places in the country based on ports and refineries, with a grid link system coupling these together and with the possibilities of the introduction of underground storage, the whole system could be integrated into an economically attractive whole.

In a lot of these instances, I feel that we tend to try to weigh up the advantages of one process versus another, not always with sufficient factual information as to how those processes really fit in the industry. All of them offer such possibilities that the industry should adopt them all, developing the large pithead coal gasification plant up to a scale where it is really getting near its commercial optimum from the economic point of view—and the same with the oil products plants. We should also, if possible, go for liquid methane to the scale on which it is commercially economic. When that has been done, the industry can look at all those processes and really compare them on a factual basis, and from that stage on any one of them can be taken a further stage and really be assessed effectively one against the other.

A great technical change has come to the gas industry. It is, of course, the biggest thing that has come in the whole of its history. The industry with limited technical resources—we must accept that, for the technical resources are still geared to the old carbonising days—is facing this change in a fairly bold manner.

The authors come from the centre of the steel industry and they have suggested in the paper that gas and coke will still be made in the steel industry for a long time. I would like to suggest to the authors that our steel industry in this country is going to be more and more affected by competition from overseas and that alternative methods of ore reduction will have to be considered very seriously, by which hydrogen and other means of reducing ore will have to play a part, and this change, which has come so suddenly on the gas industry, may be only round the corner for the steel industry.

Mr. W. Hodkinson, Deputy Chairman, North Western Gas Board: Apparently contrary to what is the accepted view, we do make substantial progress in many fields of our endeavour, particularly in the industrial field, where, contrary to the statement on [p. 2] on the subject of price, we can offer a cheaper overall service to the manufacturers in many fields of utilisation, and there we can compete to great advantage.

Similarly in the domestic heating field, up to a rating of somewhere round about 6,000 B.t.u. per hour with modern tariff structures we have a very definite edge on all our competitors. And this, remember, is a field with a potential demand of some 30 mill. tons of coal, or something like twice or more than twice the present gas output of the British gas industry.

We must agree with the statement on [p. 4], but here again we have made tremendous strides in the field of appliance development by raising the overall efficiency of utilisation from our appliances, and we should bear in mind that the very substantial improvements create a very substantial reduction in the net cost of the energy we supply to our customers. In fact, many pennies per therm have been taken off the net cost of the energy by the use of these appliances.

With regard to solid fuel, there is a sign that within the next two years we may have to be thinking about making additional quantities of solid smokeless fuel to meet the demands which have been created by the Clean Air Act. We must remember that solid smokeless fuel can play a part in developing clean heat in the home. It can tide us over the period when we have to overcome the resistance of the domestic user to the loss of the solid fuel fire, coal.

Coal basis

Mr. J. H. Towler, North Eastern Gas Board: It seems clear that the industry will continue to be based upon our indigenous resources of coal with an increasing emphasis upon complete gasification of low-grade material. Lurgi represents the most advanced plant at present available; it has considerable disadvantages, however, notably the need for hydrocarbon enrichment of the gas before distribution, the large steam requirement, and the large volume of effluent produced. One awaits with great interest the outcome of work upon the production of a rich gas by hydrogenation of coal. So far as the effluent is concerned, the disposal of this is surely to be regarded as a legitimate charge upon any process, and I am wondering whether this has been taken into account in the cost given for Lurgi gas. Perhaps the authors could give us an estimate of the effect upon the price of the gas for the worst case in which a works operating Lurgi plant had to treat all its own effluent.

On the brighter side, it seems that the possibility of supplying gas of relatively constant combustion characteristics may eventually become a reality. In addition, one foresees

the town gas distributed free from objectionable condensable and unsaturated compounds and organic sulphur. Considerable importance should be attached to the latter and I suggest that an additional argument for carbon monoxide reduction, if not complete removal, is contained in the fact that the organic sulphur content of a gas is reduced after treatment over a water gas shift catalyst. I should welcome the authors' comments on these points.

Finally, and very briefly, I should like to mention the reforming of hydrocarbons with steam to meet peak loads. The North Eastern Gas Board recently commissioned a Hercules plant for the continuous reforming of natural gas. Whereas the cyclic processes will continue to be operated on liquid feedstocks, the inherently simpler continuous reforming processes have advantages when the feedstock is gaseous and may well become important in the future.

Water gas

Mr. K. Francombe, Whessoe Ltd.: Reading this paper, I can quite frankly find practically nothing new. It is a recital of what has happened and appeared in other places, and indeed I find that certain remarks are made which one might criticise.

For example, on [p. 1] the fact that water gas production is only about half of the theoretical capacity of water gas plant is not really a statement of why water gas plant cannot be used as base load gas, but rather because if it is not used at less than its complete capacity, then what is available for peak load purposes?

On [p. 2] I find the rather unusual statement that relative costs also mitigate against town gas. I am not clear on the use of the word 'mitigate' in these circumstances. Later on [p. 2] I find that the authors think it a pity that the emission of gases from chimneys and the like under the Clean Air Act does not enable anything to be done about the emission of sulphur dioxide from chimneys. I suggest that everybody is aware of the enormous tonnage of SO_2 which is emitted, but that the reason the Clean Air Act may not incorporate any measures against this is because there is no satisfactory process yet evolved which will in fact remove SO_2 from the flue gases of power stations.

In the description of the Lurgi process at Westfield, it would be for the Scottish Gas Board to correct the authors, but as they have not yet done so, do I not gather that Lurgi at Westfield is washing out the CO_2 not by water under pressure, as was a perfectly feasible method, but by the Benfield process, using potassium carbonate?

Towards the end of the paper, it is stated that in the event of world conflict it is desirable to have our own indigenous supplies and not to be dependent on imported base material, oil, and so forth. But quite honestly I feel that in the event of a world conflict it does not matter very much whether our fuels are imported or are produced at home. I cannot see much future for fuels in a world conflict.

Finally, I should like to elaborate a little on the question of CO removal, which has been mentioned by all those who have taken part in the discussion. Apart from the fact that with the standard Lurgi gas, 29% is given by the authors as the CO_2 content, as Mr. Rooke has already said, much of this CO_2 will have to be removed not only for the Wobbe index, but for the general combustion characteristics, and as the CO_2 removal stage is the more expensive of the two stages, then I would not expect the gas to be cheapened by the omission of the CO part of the purification, because this is relatively small.

If you go on to the slagging gasifier, where there is 58% of CO, I do not think anybody in his right mind would consider distributing town gas which contained 58.8% of CO because it would be about as lethal as blast furnace gas—and we all know the accidents which occur in steelworks owing to gas of such high CO content.

CO reduction

Existing gases may often be CO reduced without CO_2 removal, because most gases which might be treated water gas would produce a finer gas with less than 20% CO_2 even after CO conversion. If they produce less than 20% of CO_2, its burning characteristics should be reasonably satisfactory. Others have worked out a number of gases from which you can convert CO to hydrogen, leaving the CO_2, and still get back to a satisfactory Wobbe number within the gas group concerned without CO_2 removal, restoring the calorific value by butane.

In view of the relative cheapness of butane, it should then be possible to carry out the CO reduction at practically no cost, because the CO conversion process in those circumstances will produce more product gas than you put into the CO converter. This extra product gas is supplied free. So one finishes up with a de-toxified gas without CO_2 removal which has cost very little indeed.

'OIL RESISTANT SURFACINGS FOR CAR PARKS'

THE new British Road Tar Association publication entitled 'Oil Resistant Surfacings for Car Parks,' is intended for the information and guidance of those engaged in the provision and surfacing of car parks.

The illustration of car parks in various parts of the country show the success obtained by the use of either dense tar surfacing or tarmacadam. These materials, bound with road tar, have a greater resistance to oil droppings than other types now available which contain binders obtained from the same basic material as the oil dropped on them.

Any disintegration caused by oil means not only expensive maintenance, but also untidy appearance, which latter is important because car parks must be sited near business and shopping centres where mud and dust is undesirable.

26th I.G.E. AUTUMN RESEARCH MEETING

Radio communications

MR. RIMMER, said: This is essentially a review type of paper which attempts to generalise on the present state of radio communication practice of the gas, electricity and coal industries in the United Kingdom, particularly with respect to the work of the Radio Committee of the combined fuel and power industries. The treatment deals with both mobile and fixed-to-fixed applications and the state of development is compared with that of other countries related to the same group of industries.

Right at the outset it should be appreciated that mobile radio already plays a very great part in both the operational and sales and service organisations of the fuel and power industries in the United Kingdom. The position of the electricity industry in this field prior to 1955 was that they were using mobile radio equipment very extensively for consumer and operational control duties: They had the exclusive use of a fairly large number of two-frequency channels at that time. In contrast, the gas industry had a relatively small usage and this was due entirely to the inadequate frequency allocations made by the G.P.O.—one single exclusive channel only being available.

In 1955, the Postmaster-General's mobile radio committee had actually proposed that the total number of channels then in use by the combined industries should be reduced by some 30% and that all the services should be operated on a shared basis. Quite clearly, the electricity industry stood to lose very considerably by these proposals, and at their instigation a combined radio committee representative of the fuel and power industries, namely gas, electricity and coal, was set up with a view to combating these new proposals. The main committee is fairly large and is served by a technical sub-committee of four members only, having one representative each from the coal, gas and electricity area boards and the central electricity generating stations, the facilities of the central electricity research laboratories being available to that committee through the representative of the Central Electricity Generating Board. These facilities have been made available to the technical panel and have been of invaluable assistance.

The intervention by the radio committee of the combined fuel and power industries resulted in the allocation by the Postmaster-General of 22 exclusive channels plus several general purpose channels on a shared basis. The case presented by the committee rested largely on the degree of interference now experienced with equipment in use and the probable development once this interference was eradicated. From the map shown in [Fig. 1], some idea can be gained of the order of this allocation so as to obtain interference-free working. This map was, in fact, the original allocation as proposed for the gas industry, and it should be emphasised that it has since been considerably modified to meet individual requirements of the area boards.

There have been a number of additions to this map and there is still very considerable development to be finalised in the Eastern, East Midlands, North Eastern and Northern Boards before a true picture could be presented; nevertheless, this map is still used as the basis of allocation by the G.P.O. It should, however, be clearly understood that complete interference-free working can never be obtained; some degree of interference will have to be tolerated.

I would refer you to [Fig. 4], which shows a photograph of interference analysis made by a light source. You can clearly see the areas of clear reception and how they spread out over some considerable distance.

The gas industry's share of this group allocation is six exclusive channels, two in the low band and four in the high band, together with a number of general purpose channels which are obtained from the Post Office on a non-exclusive basis. These two-frequency channels have a spacing of 25 kc/s, which were introduced very much in advance of the Postmaster-General's own recommendations relative to channel spacing.

The technical panel, in drawing up the allocations, had to take into account the different functions and areas of

Presentation and discussion of paper: 'Radio Communications in Fuel and Power Industries' by G. M. RIMMER, Electrical and Mechanical Engineer, West Midlands Gas Board.

coverage of the three industries; accordingly, differing allocation criteria were essential. For instance, electricity area boards operate on an 80-mile spacing, and accordingly, each area board has the use of approximately six channels. In the case of the gas industry, restricted mainly to urban areas, a 40-mile spacing was found to be acceptable and, again, this gave each area board the full use of six channels. With regard to the Coal Board, the mobile equipments operated are mainly for mines' rescue and ambulance services; consequently, very considerable operational advantages were to be achieved by the use of common frequencies throughout the country. With regard to the equipment operated by the central electricity

generating boards, it is to be observed that they operate two channels on a single frequency basis; this is termed 'simplex' operation, and it has proved very, very satisfactory indeed.

The introduction of the 25 kc/s specification implies that new equipment will be required where the old specification is too broad, but every endeavour has been made to allocate the frequencies in such a manner as to enable all existing equipment to be utilised until it has reached the end of its useful life. With regard to the take-up of allocations, both the electricity and coal industries have taken up all their allocations. In the case of the gas industry, only about 70% has yet been planned for use in the near future. It should be emphasised that if these allocations are not taken up by the various area boards, there will, of course, be the very greatest difficulty in retaining these frequencies; they will simply revert to shared channels and probably be lost to the industry for ever.

Radio link

During the preparation of the case for presentation to the Postmaster General's Mobile Radio Committee, the technical panel became increasingly aware of the fixed-to-fixed application for control of mobile equipments, telemetering and telecontrol in countries outside the United Kingdom. It was becoming obviously clear that foreign practice was tending towards the radio link rather than the pilot or private wire as we know it, and after studying this foreign practice very carefully, a case was made out for the allocation of frequencies for this duty, particularly related to the 450 Mc/s and the microwave bands.

It was observed with the more progressive of the foreign fuel and power companies that up to 50% of their communication links were in the form of fixed-to-fixed radio facilities. Their experience was such that they were now developing almost wholly in this direction, and one example may be quoted of a Canadian utility which controls, completely automatically, a 100-MW thermal power station remotely by radio and also integrates and controls the output from a number of hydro stations, also remotely and by radio. That station is completely locked up, and there is no personnel in it whatsoever.

The economic optimisation of many interconnected plants was found to be carried out quite automatically using special purpose computers over radio links and the most onerous duty—that of power line protection—was found to give pride of place to the radio link. These services are not confined to the electric power industry but include gas transmission, the control of pumping stations and also petroleum pipelines. Many of these applications have already appeared in the foreign Technical Press. It is obvious that the United Kingdom fuel and power industries are very much behind foreign practice in this field and in explanation one can only point to the complete restriction on the fixed-to-fixed facility by the G.P.O.

It may be remembered that the Postmaster General quite recently visited America regarding telephone services and since that time, it has been made known to the Committee that the Post Office will consider a fixed-to-fixed facility for fuel and power usage. The Committee is at the moment preparing a case for the allocation of channels for fixed-to-fixed facilities and when this work is complete, it is hoped to prepare a case, either for or against, a microwave backbone system through the length and breadth of the country which could be utilised on a shared basis for the telecommunication functions of the three industries.

As previously mentioned, the fixed-to-fixed facility is as yet untried in the United Kingdom and to assist the manufacturers in this respect, a standard requirement in the form of a specification has been prepared; one of the early drafts of this requirement is given in the [appendix]. The information contained in this so-called specification has been obtained from the three industries and has been discussed with several manufacturers so as to enable standard units to be produced. Already pilot equipment has been produced and demonstrated to selected personnel in the three industries.

The equipment to deal with this fixed-to-fixed facility, either for mobile links or for telemetering and telecontrol duty, is now readily available from a number of manufacturers. The technical panel have investigated a number of these equipments and are completely satisfied that they combine the best techniques available.

When considering this fixed facility against a typical Post Office line, it is not simply a question of comparing cost against cost but rather the cost for a given information capacity which must include response time as one of the main parameters. If it is assumed that data processing techniques will, in the not too distant future, be carried out between districts and divisions, then it is imperative that a high information capacity be achieved. This is precisely the reason why the radio communication link has proved to be so popular in foreign countries, it has provided a very wide bandwidth of operation, particularly in the microwave range.

I.B.M. computer

Such an application is now projected by the National Coal Board in connection with the I.B.M. computer installations in the Midlands. It is anticipated that a number of district offices will be linked by fixed-to-fixed radio and that the necessary information will be transmitted in digital form for treatment by the computer. This installation will deal mainly with accountancy functions.

The technical panel has specified a digital form of intelligence for the fixed-to-fixed facility; this is the trend of treatment abroad and probably the only satisfactory and economic method of coding for telecommunication intelligence. The capacity of a good system is therefore of prime importance and very careful thought should be given to the various systems as offered by different manufacturers because the methods they use to enhance the information capacity vary very considerably. There are, of course, complex and very sophisticated methods of producing high system capacity; in general, they are all included in some form of multiplexing. Foreign practice usually employs a fairly broad microwave band split up, first, into so-called voice channels and, secondly, into tone channels for slow telemetery work; a typical example is shown in [Fig. 5] of the paper.

The distance of a single radio hop for the fixed-to-fixed facility is usually between 25 and 60 miles and these hops

may be repeated by means of either passive or active repeater stations which may extend the system through thousands of miles; they are used for various types of traffic such as instrumentation, telemetering and computer operation, and have an order of accuracy and reliability which is higher than corresponding land lines.

The allocations proposed for these duties are indicated on [pp. 10 and 11]; it is not anticipated that these are final; they do, in fact, represent the first approach to the problem and are likely to be amended before final agreement with the Post Office is obtained. Economically, it has been found that break-even distances of radio, as against private wire working, are of the order of 5 miles and this figure has been quoted by the G.P.O. as being of the right order for allocation purposes: It will be seen that the Post Office are now giving some consideration to both economics and reliability. They have agreed to make provisional allocations on an interim basis where particular projects are planned in advance of any firm allocations and two area gas boards have already taken up two channels.

Microwave backbone

The foregoing relates specifically to the 450-Mc/s band. In the 7,000-Mc/s band, which is commonly termed a 'microwave' band, experimental equipment is already under construction for the central electricity research department and as soon as this equipment is available for test purposes, the technical panel will finalise the proposals for a microwave backbone. However, I would emphasise that foreign practice in this field emphasises and indicates very clearly that the experimental stage has long since passed, and it is essential that the industries' application engineers shall be fully apprised of this fact and the possible applications of these techniques.

It has been mentioned that the reliability of a radio telemetery system can be very high, the inherent flexibility is also almost infinite and contrasts very markedly with the rigidity of the line system, particularly with regard to availability. In the industries there is a feeling that in the past, the G.P.O. have given little or no assistance in this field; there is, however, every indication that there has been some change of heart in this direction and that assistance will be forthcoming in the future.

With regard to the fuel and power group, they can help themselves tremendously by accepting a standardised product in line with the draft specification given in the appendix, and a very strong plea is made to all potential users in this respect; it is, indeed, imperative if costs are to be kept down.

Finally, with any telecommunications scheme it is essential to cater for the future so as to achieve capital gain with time on the investment; to achieve this it is necessary to see that the capacity of the system is high; this will ensure that the system does not at least become prematurely saturated.

Mr. W. T. Hird, Distribution Engineer, Wales Gas Board: As Mr. Rimmer has stated, it is important that each area board should appreciate the uses that can be made of radio communication, and the operating and service efficiencies that can be achieved if full use is made of radio communication.

We must secure adequate radio frequency allocations today to meet our future development, for tomorrow those frequencies may well not be available. I hope that this paper will promote the positive planning of radio telecommunication systems which can be used by the radio committee to substantiate the pressure for a block allocation of radio frequencies for fixed-to-fixed use.

My board's first mobile radio system was approved in 1955. However, it was found that negotiation with the G.P.O. to obtain a frequency allocation was very laborious and as a result the system did not actually come into operation until 1957.

In 1960, we commissioned a further two mobile radio systems, and the frequency allocations were obtained readily and without delay as a result of the work of the radio committee.

Each of these systems, like many others, provides control of fitters' vans at a number of separate medium sized undertakings from one control room, urgent complaints at all the undertakings in each system being channelled to one common control room.

The centralisation of mobile control provides economy in operating costs and also in the use of radio frequencies. This latter point is of course very important in view of the limited number of frequencies available. Here, perhaps I might mention the map on [p. 3] where you will see what proves now to be quite a ridiculous allocation of six frequencies in the narrow area of South Wales. However, at the time it was proposed, it seemed to be the only available solution of the problem of the complex network in South Wales and it did appear each undertaking would have to have a separate frequency and separate control, and we would need six frequencies in that small area.

We found that coverage of a number of undertakings from one control room in the difficult terrain, from a radio point of view, experienced in Wales, could be most conveniently obtained by siting one aerial at the highest possible point in the area. Fortunately, other organisations have existing radio stations at several high points, and we have been able to negotiate space for our equipment at the most suitable of these sites on the existing masts.

Remote site

For example, we are able to obtain radio coverage of some 300 sq. miles in South East Wales from a local authority radio station which is situated at a height of 1,800 ft. above sea level. The radio equipment is installed at this remote site and is operated from our control room by a rented G.P.O. land line.

The annual capital and operating costs of each radio equipment and van, together with control room costs allocated per van amount to approximately £350 per mobile fitter. The value of a mobile fitter, who does emergency work and other work as well, varies with local conditions. In general, each of these fitters is given a host of small jobs each morning (meter changes and all those many jobs in which the un-productivity is high compared with the working time) and, between attending to emergency cases, the fitters carry out small work. We are finding that the amount of work done by a mobile fitter is equivalent to between 1½ and 3 times the normal day's output of a fitter on similar types of work.

Moving from the mobile system to the fixed-point to

fixed-point system, we have been developing a telemetry system for the eastern section of the South Wales gas grid since 1954. The system operates through rented G.P.O. land lines, and its reliability has been most disappointing. In one year, interruptions of communication due to line faults numbered 140, these interruptions affecting one or more of 12 holder stations.

Because of the poor standard of reliability experienced with G.P.O. land lines for telecommunications in Wales the possibility of using fixed-to-fixed radio links was first examined in 1956. Both what is loosely called U.H.F. and microwave systems were considered at that time on the assumption that frequency allocations would be made, but it was found that there was no suitable home produced radio or telemetry equipment available, and that importation of equipment from the U.S.A. was expensive to the point of being uneconomic.

Under review

Since 1956, the position has been continuously under review, and in 1959, it became apparent that suitable telemetry equipment would be available in 1960 based upon the recommendations of the radio committee.

With the co-operation of the radio committee we have now been able to obtain a U.H.F. allocation for a telemetry and telecontrol system to be installed to control and monitor our North Wales gas grid.

Work upon a backbone system to control seven major reception stations and two grid supply stations is planned to commence shortly. The system will be capable of extension to include further stations supplied by the North Wales grid pipeline.

The telemetry system will be of a digital scanning type conforming to the draft specification of the radio committee, the time for one complete scan of all stations occupying less than one minute, in which time 27 measured values and 60 alarms will be examined. The measured values will periodically be logged on an electronic typewriter, the logging periods being adjustable, to give a record of operations. The flow of gas into each station can be set and altered remotely from the control room by raise and lower buttons through 5% steps. Each outstation can be selected and measured values at that station then appear on a digital indicating panel.

Scanning will be interruptible to allow speech between the control centre and any station. A repeater station will be necessary, sited at high level, through which all communication will take place, and a separate V.H.F. transmitter will be installed at the repeater with talk-through facilities to enable the grid controller to speak to mobile personnel by the interruption of telemetry to use the control station to repeater station U.H.F. channel as a link.

It is anticipated that this telemetry system using U.H.F. radio will cost about £500 per annum per station inclusive of annual capital and operating costs of equipment and control centre.

Mr. W. H. Slack, Transport Officer, North Western Gas Board: This paper is in the nature of a review, but it represents a vast amount of work, not only on the author's part but on the part of the Committee to which he refers. So far as I am aware, it is the one committee of our fuel and power industries that seems to be at one with each other.

The author deals with many of the advantages to be obtained from the use of radio, and he refers to the difficulty of establishing the savings that accrue from its use. In one division of his Board, something like £7,000 per annum has been saved by the use of mobile radio and in addition, it has improved the service to the consumer in a very spectacular way. If nothing else, that in itself is a justification for its use.

There is no doubt in my mind at least that the General Post Office do not wish us to use radio in the form that we would wish, and as luxuriously as we might like. They have the monopoly, therefore what the joint committee has achieved so far, is a wonderful victory, and I think the industry should take advantage of the frequencies that are already offered and use them to the full.

Mr. Rimmer refers to 100 mobile equipments being used per base station or fixed station in the New World, and says that our average is something like 20. Discipline over the air is, of course, something that we have to learn. It is not easy to speak as the Americans apparently do in monosyllables or codes. Our men want to pass the time of day, and do. But I think as time goes on that will be eliminated.

Mr. Rimmer comes out very strongly against the use of Duplex equipment. We in the North West have used it since its inception, and we like it. We went into this radio field to provide a facility which did not exist by any other methods, and after a lot of thought, we came to the conclusion that the nearest we could get to the ordinary telephone system was what we wanted, and a Duplex system gives you precisely that. The biggest ivory-head we may employ can use Duplex but he needs a good deal more technique and experience to use Simplex. Electricians talk about the operational and technical disadvantages of the Duplex system which I personally have not met, and I am perfectly prepared to rest my case on the fact that the G.P.O. themselves, with their recently inaugurated public mobile system have installed a full Duplex network. The largest police force in this country, with well over a thousand mobiles—the Lancashire County Force—uses Duplex, and they like it. We had intended and we still intend, as time goes on, to integrate our V.H.F. network into our intercom. system and, as Mr. Rimmer so rightly says, Duplex is the only way we can do it.

For emergency

Finally, the question of fixed to fixed. With fixed to fixed radio, we have the only guarantee to maintain our V.H.F. radio network in time of war. We have made a special point to the G.P.O. that we need our system for emergency purposes in peace and war, with emphasis on the latter. They in turn have accepted our right to use radio in war. My information is that, if this country were attacked, the normal telephone network would cease to exist and I think, therefore, if we rely on pairs of wires rented from a G.P.O. which is as vulnerable as that, it is time we thought again.

There is the question of the control of any national grid that we may in the future be faced with. I am

positive that a fixed to fixed link radio is the only reliable method that can give gas engineers, distribution personnel and others, the information they require.

Mr. Frederick Bell, Distribution Engineer, Southern Gas Board: Mr. Rimmer gives us a figure of £7,000 per annum as a saving in one division of his board and, although customer service is of paramount importance, it would be of interest to know just what he has put into his figure to get that £7,000.

We learn from the paper that all the electricity boards and the National Coal Board have 100% mobile coverage and most of it is to be the new 25 kc/s specification. Is this because they have had so much enthusiasm for the new specification that they have renewed their equipment as a routine procedure without waiting for the G.P.O.'s approval of the specification?

To operate a large number of mobiles satisfactorily, especially when they cover so many different types of operators and many of them working at considerable distance from their vehicles, selective calling, preferably on loud hailers, is essential. We learn from America that this type of selective calling is possible and is used extensively there. For a small number of mobiles, a call sign can be used, but once the number exceeds 12 to 15 mobiles per station even this becomes unwieldy and we will be very pleased if Mr. Rimmer can give us more details of the selective calling system, and how quickly we shall have it available to us.

As many of you will know, I am no recent convert to supervisory control of holder stations, and my own experience with supervisory remote control using G.P.O. land lines for the remote operation of holder stations both in Liverpool and on the Aldershot grid has been entirely satisfactory—quite different from the experience Mr. Herd has had in Wales—but more recently, on another system, some 15% of the faults on the new systems are attributable to G.P.O. land line failures.

If this is the pattern for the future of G.P.O. land lines, the use of U.H.F. fixed to fixed working becomes more and more attractive. Mr. Rimmer has indicated that, although two area boards have taken up frequencies, the equipment is not installed, and we would have liked to know something about the reliability factor as applied to equipment operating in this country, in heavily populated areas, and, probably under industrial conditions. Are our conditions any different from those in America, bearing in mind the differences in the country? Even for the operation of fixed to mobile equipment, considerable difficulty has been experienced in obtaining planning permission for elevated sites for the erection of aerials and the choice of special sites for aerials to be used for fixed to fixed working will be even more limited. It seems inevitable that much more sharing of aerial masts with other concerns will have to be accepted.

Finally, if we are to adopt fixed to fixed radio controls for distribution plant, then the makers of the radio equipment should be prepared to provide the whole of the sensing and coding equipment which will be required both for the control room and the controlled station. We want to be able to go to one firm, tell them our requirements and have the whole of the work carried out by one organisation, without employing a series of contractors.

BOOK REVIEW

'A National Fuel and Power Policy'

ANY voice crying in the fuel wilderness championing the case for a return to the greater use of coal should be heeded, especially as the West becomes increasingly dependent on oil. That it should come as a policy statement from the Association of Scientific Workers is particularly significant.

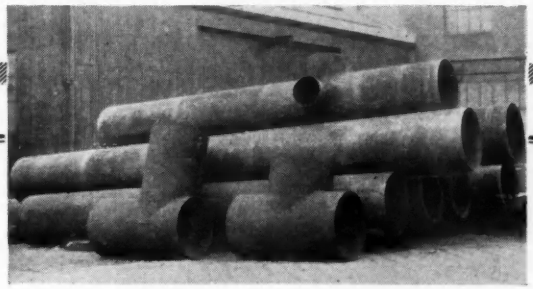
In a publication entitled 'A National Fuel and Power Policy,' issued recently, the Association put forward 12 main recommendations as to how the economy of this country could be best served by its own existing sources of power, pointing out at the same time that it had borne in mind the social consequences of inevitable technical changes, the needs of consumers and the necessity for co-ordination between different types of fuel.

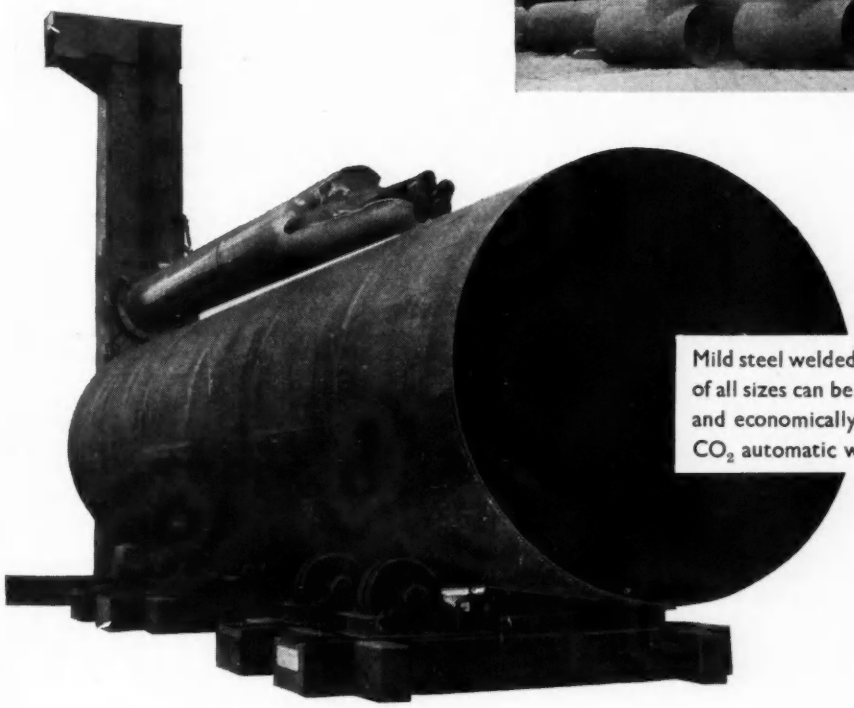
Undoubtedly the Association's chief criticism of the present fuel situation is the Government's refusal to have anything to do with a national fuel policy, preferring to allow the consumer to retain his freedom of choice. This is of course particularly difficult to refute, since individual fuel industries may well feel that the big international oil companies may not be playing quite fair; in fact the Association broadly hints that once oil is 'in,' the companies may think the time has come to raise the price of oil to a more 'economic' level.

This is a matter of opinion, but the importance of giving our coal industry some genuine incentive is beyond argument. This the recommendations set out to do. The first five may be summarised as a sweeping away of the uncertainty facing both the National Coal Board and its employees. A raising of the efficiency of coal production and the assigning to the industry of an annual guaranteed tonnage market which could be sustained by subsidising specific uses for coal are the most striking, but the Association also recommends the investigation of distribution methods and that research into the production and utilisation of coal and tar chemicals should be co-ordinated. The view that electricity generation should be based on coal, coal gasification developed, and the electrification of the railways completed in ten to 15 years time, seemed particularly practical; so also was the acceptance of oil with its great flexibility to meet short-term fuel requirements. The remaining recommendations concerned the planning of utilisation and research, and a plea for adequate funds to be made available for capital development in the nationalised industries.

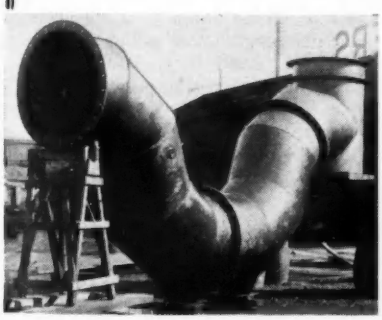
If the scientists and the technologists are convinced of the value of these proposals, there would be a good chance of their success being assured, but any change in fuel utilisation by industry is only likely to be made on its relative merits and cost.

Mild Steel Welded Mains etc.





Mild steel welded mains and pipework of all sizes can be dealt with promptly and economically by our new Fusarc CO_2 automatic welding machine.



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Technical developments

This week four pages of new products for the industrialist. The reviews include gas flow controllers, thrust borers, and p.v.c. conveyor belting.

Gas flow controllers

UTILISING the gas and not depending on an auxiliary system, for example an external air supply, Gas-Stat controllers are self-contained and self-operating. They are of simple design, with consequent ease of maintenance and freedom from faults. Apart from the differential linkage which measures the deviation of the actual from the desired value, the instrument consists only of a Bourdon tube assembly and a conical control valve.

Corrosion risks are reduced to a minimum by the use of a plastics valve operating on a silver-bronze seating, together with cupro-nickel and large bore brass tubing. A specially-designed and gasproof synthetic rubber gaiter on the control valve assembly and the embodiment of only one joint in the internal system ensures complete gas-tightness.

Normal variations in the gas supply pressure will not affect the efficiency of operation, and the sensitivity of control is easily adjusted. The actuating Bourdon tube, being part of a mercury-in-steel system, is responsive to changes in plant operating temperature, and at temperatures below the desired operating temperature, as determined by the setting of the 'desired value index', the relay valve is balanced by the pressures operating on either side of it, so permitting the flow of gas to the burner. With increasing temperature the control valve is progressively closed by the action of the Bourdon tube.

The control unit incorporates a sensitivity adjustment which is similar to the proportional band adjustment of the Tobbi unit incorporated in certain other Negretti and Zambra controllers. But instead of being fitted with a percentage scale, this unit is fitted with a plate which indicates the direction of lever movement necessary to obtain increased or decreased sensitivity within marked 'Fine' and 'Coarse' limits.—*Negretti and Zambra Ltd.*

Conveyor belting

THE latest successful development by the Wellingborough research laboratory of Rubber Improvement Ltd., who developed Leonex the first fire-resistant conveyor belting, is Green Bond conveyor belting which combines the advantages of p.v.c. and terylene. It is stable, flexible, light in weight and has an extremely high tensile strength. It is resistant to wear, impact, shock loads, acids, alkalis, oils and greases. It also incorporates a special feature—'lateral ripstops'—which gives it an improved resistance to longitudinal ripping and better fastener holding. Its high resistance to stretch under tension load eliminates the many problems which arise from belt stretch.

Green Bond belting has been used with excellent results for all types of mining in many countries of the world, including the N.C.B. which have already in use millions of feet of Rib p.v.c. belting among which is Green Bond; all have been officially approved. Green Bond has been awarded the U.S.A. Bureau of Mines acceptance 28-28 for flame resistance.

Incorporating high tensile terylene, it has a much higher strength per ply than any other multi-ply conveyor belt of similar weight. Consequently, for a given tension requirement fewer plies are necessary, and so a lighter and more flexible belt can be employed at a much lower cost. A Green Bond belt can therefore satisfactorily transmit higher horsepower using much smaller pulleys than would be required when using a heavier belt of cotton, cotton/nylon, rayon or cotton/rayon. Its unique 'weft' construction has been designed to reduce longitudinal ripping, and at the same time ensures good troughability and fastener strength. High resistance to impact, and many other technical advantages combine to produce a conveyor belt capable of undertaking all duties, no matter how arduous, at a lower cost. It is resistant to acids, alkalis, oils and greases; and its special polyvinyl chloride covers have a high resistance to abrasion, tear and cut growth.

The ability of Green Bond to withstand high tension loads, particularly when starting the conveyor, is acknowledged as being the means of overcoming 'slippage,' 'tracking' and 'take-up'—problems which invariably are caused by abnormal belt stretch, particularly in the initial stages of operation. Green Bond p.v.c. terylene, is both cheaper in price, and superior to other conveyor belts designed to undertake similar duty.

A typical comparison of Green Bond with other belting showed that a 30-in. belt of Green Bond p.v.c. terylene needed only a 12-in. diameter single drive pulley for the efficient performance usually attained by a 32-oz. 30-in. wide, cotton duck, 5-ply belt needing a single drive pulley of 24 in. The approximate weights of belt per lineal foot were 4 lb. and 5.5 lb. respectively.

Comparing a Green Bond p.v.c. terylene 4-ply belt 30 in. wide with a 32-oz. 30-in. wide, cotton duck, 6-ply belt, the minimum diameter single drive pulleys for equal efficiency were 16 in. and 30 in. respectively. The tension ratings per in. width were, 240 lb. per in. and 216 lb. per in. while the approximate weights per lineal foot were 5 lb. and 6.5 lb. respectively.

Green Bond high tensile belting is composed of a fabric built up of a terylene warp with a terylene/jute weft, its colour is brunswick green, its inter-ply is a p.v.c. compound and the covers are made of anti-static p.v.c. Among its special characteristics are its low stretch factor, its abrasion and cut resisting p.v.c. covers, its excellent resistance to impact and its unlimited store life.

Its greater flexibility enables pulley diameters of reduced diameter to be used and consequently a belt of higher tension rating can be employed over existing pulleys. The average weight of belt with $\frac{1}{32}$-in. (8-mm.) covers on each side is

3-ply, 25 oz. per sq.ft. (73 g. per sq.dm.); 4-ply, 32 oz. per sq.ft. (95 g. per sq.dm.); 5-ply, 38 oz. per sq.ft. (112.5 g. per sq.dm.). An extra $\frac{1}{32}$-in. thick cover adds 3.5 oz. per sq.ft. (10.68 g. per sq.dm.).

When installing a new conveyor, it is desirable to obtain expert advice as to the most suitable type, size, length, width and speed of operation of the proposed unit. A satisfactory decision can only be arrived at after a full consideration of the complete project in relation to the type of material to be conveyed and to the practical and economic aspects of the problem.

The first thing to determine is the total tension of the belt. Knowing this and the width of the belt to be used, the minimum required working tension of the belt per in. width can be established. The next step is to select a suitable belt which has an adequate tensile strength and will fulfil the pulley requirements of the conveyor system.

There will usually be a number of constructions which will meet some of the requirements—e.g., tensile strength, but it can be shown that for a given task in such installations, a Green Bond belt, composed of fewer plies than those in other corresponding makes, can be chosen with confidence.—*Rubber Improvement Ltd.*

New thrust borer

THE new Junior hydraulic thrust boring machine has been designed for boring pilot holes under roadways, drives and paths to accommodate services, cables and small diameter mains. Operated by one man with the minimum of excavation, the machine offers considerable economies in terms of speed, efficiency and the reduction of reinstatement costs. Boring can also be carried out without interrupting traffic.

The machine measures only 2 ft. by 1 ft., and is entirely self-contained. It is capable of exerting a thrust load of eight tons to the boring head and is supported by a large area thrust frame built into the unit. The single ram is

The Junior hydraulic thrust borer.

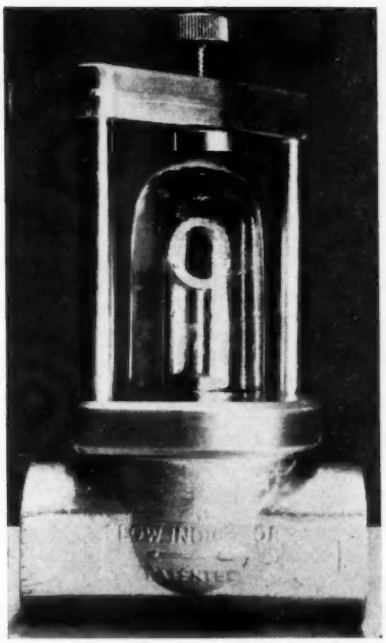
operated by a twin piston double-action hydraulic pump housed in the main frame of the machine and connected by high pressure flexible hose.

The carriage of the Junior hydraulic thrust borer is spring return actuated by a pressure relief valve on the pump. Four thrust positions are provided on the carriage and a retaining clamp is fitted to prevent the boring rod from lifting in the machine carriage during the thrusting operation.

When the hole has been thrust bored, the machine may be reversed into the excavation and the rods withdrawn bringing with them the service or cable by means of a special adapter.—*E. Pass & Co. Ltd.*

High pressure flow indicator

THE success of the standard Arkon flow indicators—a simple visual indication of oil or water flow by means of a moving spindle—led to a demand for a version which would withstand very high pressures. Walker, Crosweller



The Arkon flow indicator.

& Co. Ltd. now announce the introduction of this type of indicator fitted with a high pressure cap which will take pressures up to 22 p.s.i.—*Walker, Crossweller & Co. Ltd.*

Bag filter

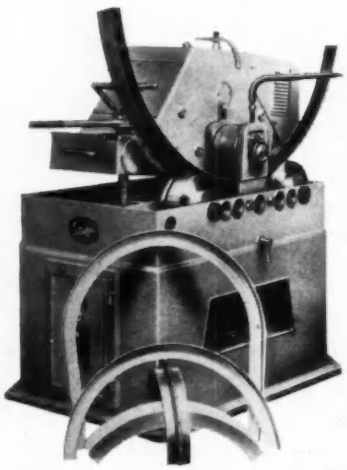
THE Holmes-Standard bag filter has been designed to handle heavy dust burdens of particles of all sizes, including those in the sub-micron range. It consists of a cylindrical tower, the lower section of which is formed into a conical hopper through which the collected dust is removed for disposal. The tower itself is divided into three, four or six compartments each of which contains a number of filter bags. As the dust-laden air enters the hopper the heavier particles are separated out by cyclonic action; finer particles rise with the air stream into the filter bags where they are retained by the fabric as the cleaned air passes through and is drawn out at the top of the filter into the central air duct.

When in operation, one of the compartments is always isolated for cleaning; the collected dust in the bags is removed by simultaneous shaking and the passage of clean air through the material of the bags in the reverse direction. The isolation of each compartment in turn is carried out

automatically by a central valve mounted under the top plate of the filter; the valve mechanism is driven by a geared motor unit which in addition to controlling the reversal of flow of air in the isolated compartment, also controls the flow of dust-laden air through the sections of the filter in operation.—*W. C. Holmes Ltd.*

Rolling machine

A MULTI-PURPOSE rolling machine of continental origin, designated the Staffa-Universal, has been added to the Staffa range of bending machines and hydraulic equipment, and is designed primarily for carrying out consecutive rolling operations in tube or rolled steel sections, especially for boiler and steel fabrication work. It is the only machine of its type to be equipped with holling suspension which allows continuous correction of secondary deformations. Other machines on the market



The Staffa-Universal rolling machine.

normally use lateral rollers to square up the section during the bending operation, but it has been found that such squaring devices have only a limited action, and it follows that the sections leaving the machine are not exactly flat. In the case of steel angles, the angle opens or closes and does not remain a right angle.

The design of the Staffa-Universal permits adjustment of the rollers to correct the natural deformation of the section. For example, the legs of a rolled steel angle tend to open out during rolling, and this can be corrected by a simple adjustment of the pressure roller, whilst a similar adjustment keeps the circle or curve flat and true so that further correcting work is unnecessary.

The machine is particularly useful when bending tubes, as the rolling suspension serves to support a fourth calibrating roller which allows true bends with practically no deformation of section. It can also be put to other uses, such as a circular saw and for circular shearing, as an edge moulder or as a machine for forming sections and bending them afterwards.

The Staffa-Universal uses the principle that boiler works have to deal with multiple and varied operations, and very often the parts required would only be in small quantities, which renders it practically impossible to buy a machine for this purpose. As an example, in addition to the possibilities of bending, an attachment allows the turning down of edges on discs and rings, and a large variety of similar work.

The standard fittings manufactured for each particular operation can be easily and quickly changed, resulting in a high rate of productivity on consecutive operations. The machine is of modern design and robustly constructed of welded steel throughout. It is supplied complete with a 4-h.p. 440-V, 3-phase motor, protected by a double-action circuit breaker. Continuous lubrication at pressure is ensured by a motorised pump set. The shafts and gears are made from treated Cr-Ni steel and specially forged and treated bronze, permitting the maximum momentary overloading.—*Chamberlain Industries Ltd.*

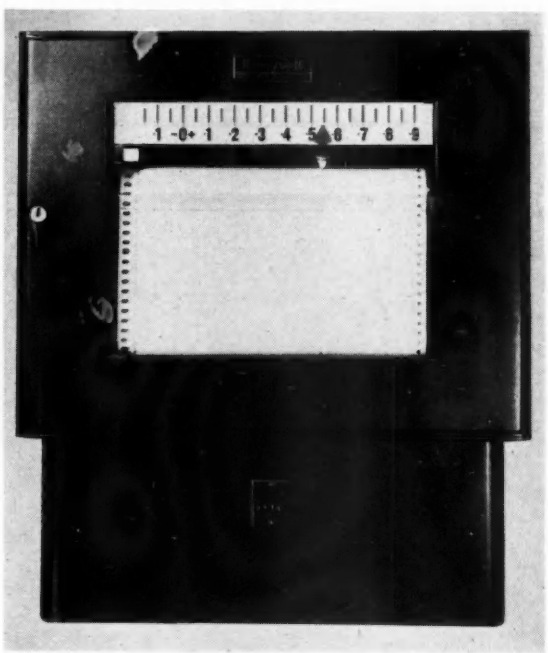
Continuous integrator

A CONTINUOUS integrator that provides an integral of any variable measured on an electronic strip chart recorder, has been produced by Honeywell Controls Ltd. The integral is obtained by counting known areas enclosed by a curve.

The total under the curve is presented as a permanent record on the left of the chart as the curve appears; a pen marks each count on one side of a line, and every tenth count on the other side. Any area can thus be easily evaluated. Simultaneously, the integral is shown on a four digit counter.

The continuous integrator is fitted beneath, or near, a Honeywell ElectroniK strip chart recorder and is used in applications requiring measurement of a quantity over a period as well as instantaneous values.

Typical applications include gas chromatography, flow, electrolytic cell current, electric power, power consumption



The Honeywell continuous integrator

in an electricity network, continuous weighing, electric current measurements to determine the efficiency of aluminium pot lines.

Output of the integrator can take the form of a direct current pulse for feeding to data handling apparatus or remote counting equipment.

A four-gear speed change device in the recorder provides

different chart speeds to suit low or high count rate. The pulses which drive the counter are derived from a photo-diode energised from a beam of light which is interrupted by a slotted disc.

Accuracy of integration is within .5% of full scale area for integration between 5 and 100% of full scale, and this accuracy is maintained through supply voltage changes of ±10%. Accuracy of the recorder remains unaffected at ±10 microvolts on the 1-mV span.—*Honeywell Controls Ltd.*

New impact wrench

A NEW torque controlled, reversible, impact wrench, designed for close control of final bolt tightness, has been introduced by the Consolidated Pneumatic Tool Co. Ltd.

This new wrench operates as a conventional wrench until

The new consolidated torque controlled reversible impact wrench

the preset torque value is reached, when the torque control device cuts off the air supply to the motor and the wrench ceases to impact. The required loading is obtained by the operation of a torque adjustment screw located on the handle of the wrench and a lock-out button on either side can be pressed to lock-out the control and allow the wrench to develop its full capacity.

The wrench is available in two forms, the CP.610—RLTP wrench being equipped for spline drive, whilst the CP.610—RTP has a 1-in. conventional square drive. Features of the spline drive shanks and sockets are such points as the achievement of maximum safety through positive retention of the socket, since the retainer is integral with the shank and is automatic in operation. A quick release button in the shank frees the socket for removal. The greater efficiency of the spline connection as compared with square drive also reduces power losses and enables socket changes to be made with greater speed. This efficiency of power transfer also results in more even stress loading of the socket and enables it to be considerably lighter than the equivalent square drive socket.

The weight of each model is 23 lb., the overall length being 16⅜-in. The hose size for use with the tool is ½-in., and the inlet pipe thread size is ½-in. The maximum bolt size, when using the lock-out is 1¼-in., and the minimum torque is 300-ft./lb. the maximum being 600-ft./lb. When bolting resilient materials, the minimum figure can be appreciably lowered and the maximum can be raised when bolting rigid materials.—*Consolidated Pneumatic Tool Co. Ltd.*

Trade Publications

As part of their overseas sales development programme the Hymatic Engineering Co. Ltd., have published leaflets in French and German describing the Hymatic Hydrovane range of mobile air compressors.

The three-colour leaflets feature action photographs and a schematic diagram of the Hydrovane unit, with technical information to explain its advantages over piston-type compressors.

Hymatic Hydrovanes have been exported successfully to the Continent for some time. The leaflets are intended to be used by Hymatic Distributors in Belgium and Switzerland and to extend sales to other French and German speaking parts of the world.—*The Hymatic Engineering Co. Ltd.*

Gas Atmospheres Division of the Incandescent Heat Co. Ltd., has brought out a leaflet, No. V.59 (2). It is entitled 'Incandescent Gas Atmospheres Division—What we make—2,' and is the second leaflet in the series.—*Incandescent Heat Co. Ltd.*

Pre-heating and stress-relieving pipes on site is the subject of a booklet from Stress Relieving Services Ltd. It describes new equipment produced by this firm, which at present offers its service, but will soon be marketing this equipment.—*Stress Relieving Services Ltd.*

A booklet entitled 'Inco-Weld "A"' from Henry Wiggin & Co. Ltd., describes the welding electrode and the filler wire sold under this name. These materials, specifically designed for joining dissimilar metals, are described in their available forms, and their use and properties are set down. —*Henry Wiggin & Co. Ltd.*

Jeavons Engineering Company has had published a new catalogue entitled '"JEVCO" Fittings for Copper Tube.'—*Jeavons Engineering Company.*

Receiving instruments are the subject of a new catalogue brought out by Negretti and Zambra. The air-operated receivers listed can all be used with Negretti and Zambra transmitting instruments and with those of most other manufacturers, if the output air pressure is from 3 to 15 p.s.i., and proportional to the variable being measured. A general description of each receiver indicator, recorder and controller is given.—*Negretti and Zambra Ltd.*

A booklet has been published by Audley Engineering Co. Ltd. on the power operation and remote control of Audco valves. It provides details of Audco actuators, with drawings showing dimensions, including the entirely new Nos. 1 and 7 actuators. Also detailed are control circuits and auxilliary equipment, and questions to be considered when preparing a power-operated valve scheme are provided.—*Audley Engineering Co. Ltd.*

THE Public Works and Municipal Services Congress and Exhibition at Olympia provided an impressive display of the latest equipment, materials and methods for the development and maintenance of public services of all kinds. Gas is one of the most important of these services, and the exhibits included many which are applicable to various aspects of the gas supply industry.

PUBLIC WORKS EXHIBITION

NEW EQUIPMENT WILL AID GAS INDUSTRY

PIPELAYING is an important part of the civil engineering side of the gas industry and a number of firms showed new equipment for this work at the Public Works Exhibition.

John Allen & Sons (Oxford) Ltd., introduced some new trenchers, including the Allen wheel trencher, Model 140, which will cut trenches from 17 in. to 30 in. wide, with a maximum depth of 5 ft. 6 in. and a range of digging speeds up to 37.3 ft. per minute.

Powered by a Leyland 50 b.h.p. diesel engine, the Model 140 is a tracked vehicle with low ground pressure which discharges the 'spoil' to the side of the trench, giving ample room for working with ease of backfilling.

For smaller trenching duties John Allen offer the new Allen 3/12 trencher, which is capable of digging trenches 3 in.—4 in. wide down to 5 ft. 6 in. deep or 13 in. wide and 2 ft. 6 in. deep, with a wide range of intermediate width and depth capacities. The operator sits on the machine with all controls conveniently to hand.

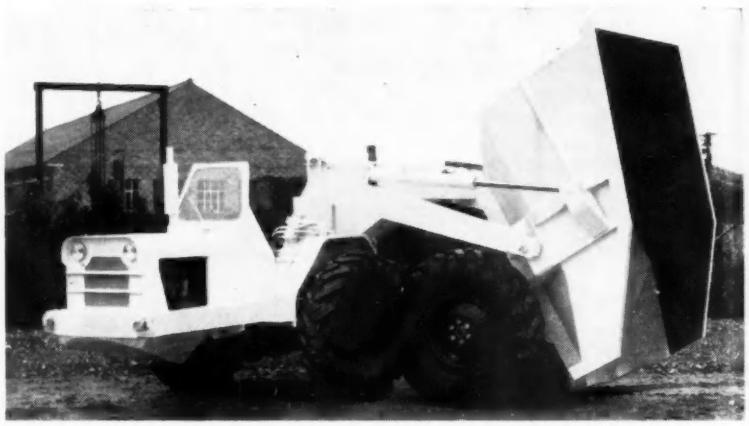
Board interest

A backfill blade is available as an attachment. This can be set straight or angled to the left and is raised or lowered hydraulically. This trencher has recently been under test by engineers of one of the gas boards.

Designed for use as a dragline, drag shovel, face shovel or conventional crawler-mounted crane, the new Neal-Unit 'NU 1620' may be expected to find many applications on the civil engineering side of the gas supply industry.

This machine, which is the first product of the recent manufacturing agreement between **R. H. Neal and Co. Ltd.,** Grantham, and the **Unit Crane & Shovel Corporation,** of the United States, has a number of unique features, including 360° view by the operator, in-line engine mounting and one-step gear reduction obviating the use of chain drives.

In the excavator field, **Thomas Smith & Sons (Rodley) Ltd.,** showed their well-known Smith '12' universal excavator, fitted with the new type deep digging gooseneck trencher equipment which allows for deeper digging over corners of tracks. An interesting safety note on this stand was the new type 'Forward' electro-alarm warning device which can be fitted to excavators to protect the operator when the machine is working near power lines.



This Muir-Hill-Camill, a 7 cu.yd. articulated dump truck with a 20,000 lbs. payload, is a remarkable new machine which made its public debut on the stand of E. Boydell & Co. Ltd., of Old Trafford, Manchester, at the Public Works Exhibition.

Dump trucks of varying capacities were on show at the Exhibition, including the new 'Douglas' 22-ton truck shown on the stand of **Thos. W. Ward Ltd.,** Sheffield. This truck is powered by a Cummins NT-6 250 h.p. diesel engine and has a maximum speed of 25 m.p.h. at 34 tons gross. **C. H. Johnson (Machinery) Ltd.,** Stockport, showed their 'Twin/Sixty-five' dumper with a payload of 55 cwts. and supplied with Johnson 'Tripskip' multi-skip handling equipment.

No longer does the civil engineer dig a trench for a pipe and leave it at that. The comparatively new study of soil mechanics often has a part to play. **Robert M. Douglas (Contractors) Ltd.,** Birmingham, made a point of this by referring on their stand to the activities of their Soil Mechanics and Foundation Engineering Department. In an interesting booklet, this Company supplies details of the laboratory and field equipment which is available for soil testing work.

Pipes for gas

In addition to equipment used in the movement of soil, the exhibition also included an important section devoted to the pipes used for gas. **Stanton Ironworks Co. Ltd.,** Nottingham, the largest European manufacturers and exporters of spun iron pipe, showed an 18-ft. length of spun iron pipe with an internal diameter of 42 in.

Until recently, the largest spun iron pipe manufactured in Britain was Stanton's 27-in. pipe but the Company's new plant will produce pipes up to and including 48 in. diameter.

Another interesting Stanton product, and one which is thought to be of future importance to the gas industry, is the prestressed concrete pressure pipe manufactured under licence from the Lock Joint Pipe Corporation of the United States.

Spun iron

Other companies well known in the pipe field included **Clay Cross (Iron & Foundries) Ltd.,** Derbyshire, who showed their range of spun iron pipes and, like other companies, featured the well-known 'Tyton' joint, widely used at the present time in water and sewage mains. Developments are now said to be on foot which will enable this flexible joint to be used for gas pipes.

Cast iron pipes for gas mains were shown on the stand of the **Staveley Iron and Chemical Co., Ltd.,** Chesterfield. These included examples of pipes produced by the Company's own sand spun process, centrifugally cast in moulds and (in the case of larger sizes) vertically cast.

Protection of pipes against corrosion is always an important problem for the gas distribution engineer, particularly where mains and services have to be laid in aggressive soils. Several firms showed products which successfully protect pipes against corrosive influences.

One of the best-known firms in this

Here is the new Merton four-wheel drive front loader '65A,' one of two new front loaders introduced, which are based on the successful hydraulic '59'.

field is **Winn & Coales Ltd.,** London, whose 'Denso' tape is well-known in the gas industry.

The firm reports that even though pipes are now being increasingly supplied with 'built-in' anti-corrosion protection, 'Denso' finds many applications even with factory-coated pipes, for instance, at joints or to protect parts of the pipe coating which have become damaged in transit.

Research

At this exhibition, **Winn & Coales Ltd.** laid emphasis on one aspect of their operations which does not always receive the attention it deserves, namely, the intensive and regular programme of research which supports the products and services the Company provides.

Originally established to provide strict control over the Company's own products, the laboratories now conduct research into the various forms of corrosion and the best methods of combating them.

Particularly important is the work in the fields of micro-biological attack and electrolytic effects. Recently extended and rehoused, the department possesses a wide range of the most modern equipment, some of it specially designed by the Company.

Stewarts and Lloyds Ltd., Glasgow, have recently introduced a woven-glass reinforced sheathing which is applied at the works concurrently with hot bitumen-asbestos mastic and embedded just below the surface.

This covering protects the pipe from the time it leaves the factory against damage in transportation and from any accidental damage associated with standard pipe-laying practice.

Among recently-installed gas pipelines which have been protected with Stewarts & Lloyds woven-glass reinforced sheathing are sections laid by the North Thames Gas Board, the Southern Gas Board, the East Midlands Gas Board and the North Western Gas Board.

Several new items of equipment for maintenance operations on pipes were shown at Olympia, including the brand-new 'Lansas' pneumatic pipe-stopper, introduced by **General Descaling Co. Ltd.,** Worksop.

The 'Lansas' pipe plug consists of a robust cast aluminium body with a tough reinforced rubber inflatable sealing ring. The plugs are available in a range of standard sizes from 4 in. to 24 in., with larger sizes and shapes other than round obtainable if desired.

To use the plug, it is simply inserted at the mouth of the pipe and the tube inflated by foot-pump, to provide an absolute seal which is claimed to be so effective that welding can be carried out on gas mains without risk of an explosion. Removal is effected equally easily.

E. Pass & Co. Ltd., Manchester, can always be relied upon to introduce some interesting new equipment at any exhibition they attend, and this year their recent introductions included the 'Junior' hydraulic thrust boring machine which can be operated by one man with the minimum of excavation and offers considerable economies in speed, efficiency and lower reinstatement costs.

Self-contained

This machine, which is capable of exerting a thrust of eight tons, measures only approximately 2 ft. by 1 ft. and is an entirely self-contained unit.

Also shown by E. Pass & Co. Ltd. was the 'M-Scope' pipe finder and leak detector, manufactured by the Electronics Division of **Bruce Peebles & Co. Ltd.,** Edinburgh, and marketed by E. Pass & Co. Ltd.

The entire equipment weighs only 10 lb., its construction includes very reliable transistors and printed circuits and in operation it is accurate and capable of deep penetration.

The 'M-Pact-O' probing rod will make a small hole through concrete, asphalt or rocky ground when accurately checking the depth and location of pipes found by the 'M-Scope' pipe finder.

An exhibit on the stand of the **Victaulic Co. Ltd.,** London, showed how services made with the well-known 'Viking Johnson Junior' service tees can be tested by air pressure before they are brought into use. The 'Junior' coupling has all the advantages of the larger 'Viking Johnson' coupling, but covers sizes from ¼-in. to 2-in. nominal bore. The coupling is primarily intended for gas services.

Big strides

Mechanical handling at gas works and other installations associated with the gas supply industry has made big strides in recent years, particularly in the design and performance of mechanical shovels of different kinds.

The Merton Engineering Co. Ltd., Feltham, introduce two new front-loaders, based on the successful hydraulic frontloader '59.'

The smaller of the two new models is powered by Ford 4-cylinder 61.5-b.h.p. diesel engine and is sold as the '65A.' The larger model, the '80A,' has a Ford 6-cylinder 80-b.h.p. engine.

Both have torque converters, power-shift transmission, power-assisted steering and planetary hub reduction in the axles. A special feature of both models is the high-position, front-mounted cab giving exceptional 'on-the-job' visibility and a 'load-over' height of 12 ft. 9 in., which is particularly important when loading coke into high sided wagons.

New loader

E. Boydell & Co. Ltd., Manchester, offer the new '2X' hydraulic loader, with interchangeable ¼, ½ and ¾ cu-yd. buckets, for the economical handling of smaller outputs and particularly for use in locations where extreme compactness and manœuvrability are essential, as in many gas works. This loader has a maximum forward reach of 3 ft. 9¼ in. and a maximum turning circle of 20 ft. 9 in.

One of the most important pieces of equipment in many plants where gas is used as an industrial fuel is the compressor, and a number of new developments in the compressor field were shown at the exhibition.

A new air compressor, specially designed for the smaller workshop and foundry, was shown by **Atlas Copco (Great Britain) Ltd.,** Hemel Hempstead. Known as the 'TT6' compressor, the machine is a two-stage, single acting model with an inter-cooler built for a normal working pressure of 100 p.s.i. and with a free air delivery of 140 cu.ft. per minute.

Its leading features include compactness and the fact that it is mounted on bonded rubber feet which eliminate foundation costs and enable the compressor to be placed on concrete floors wherever it is needed.

A two-stage, double-acting air compressor plant, the 'Broomwade' type V.500, was shown by **Broom & Wade Ltd.**, High Wycombe. This compact and well-designed machine delivers 525 cu.ft. of free air per minute at 100 p.s.i. with a speed of 485 r.p.m. It is skid-mounted and is therefore equally suitable for permanent or mobile duty.

Other companies showing compressors included **Joy-Sullivan Ltd.**, London, whose exhibits included the powerful 'WN.112' industrial heavy duty stationary compressor which is available over a range of capacities from 400 to 1,000 cu.ft. per minute free air delivered at 100 p.s.i.

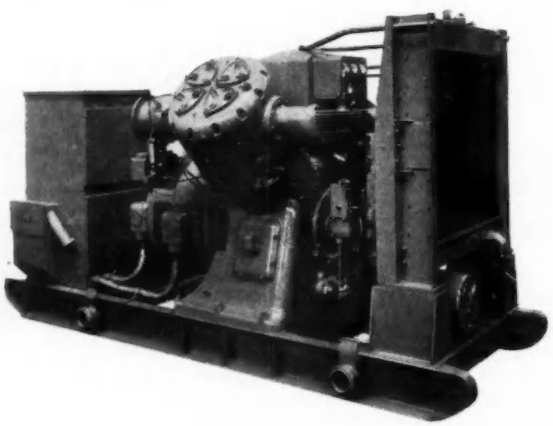
Compressors

A large number of new items of equipment were displayed on the stand of **Consolidated Pneumatic Tool Co. Ltd.**, London, including two new compressors in the 'Power Vane' range and a new torque controlled impact wrench for use on bolt sizes up to 1¼-in. diameter, known as the 610 RLTP.

With the increasing interest in gas for space heating in offices, factories and other buildings, the need has grown up for methods of controlling the heat in order to make maximum use of the economy and convenience made possible by the flexibility of gas as a form of fuel.

A particularly interesting piece of equipment for use in this connection is the new 'Timestat' time switch shown by **The Horstmann Gear Co. Ltd.**, Bath. This is a method of controlling the electrical controls of heating systems and is especially recommended where the heating schedule is not on a regular daily basis but can be forecast over the seven-day period for which the apparatus works.

The 'Broomwade' Type V.500 two-stage, double-acting air compressor plant which delivers 525 cu.ft. free air per minute at 100 p.s.i.; speed 485 r.p.m.



By means of a simple method of adjustment, the heating schedule for a seven-day period can be set into the 'Timestat' which incorporates a 5-amp. microswitch.

The schedule thus set will continue to repeat over successive seven-day periods unless a new schedule is set in.

It has always been a feature of the Public Works Exhibition that the organisers, the Municipal Agency Ltd., give it an educational as well as a trade value.

Informative

In the exhibition itself this was shown by the number of research and scientific institutions taking stands for information purposes. **The British Road Tar Association,** for example, mounted a stand as an information bureau which well demonstrated the Association's three-fold purpose of seeking to ensure the high quality of the product, the best methods of applying it and publicity designed to keep everyone concerned aware of the merits of this indigenous material.

Nor should it be forgotten that an important congress was held in conjunction with the exhibition, at which a number of highly significant papers were delivered by a team of acknowledged experts.

Among the institutions which sponsored sessions of the congress was the Institution of Gas Engineers, under whose auspices two papers were delivered.

Mr. W. H. Welch spoke on 'Space

The gas industry will find many applications for this new Neal-Unit 'NU 1620' dragline, drag shovel, face shovel or conventional crawler-mounted crane.

and Water Heating Equipment in Houses and Flats to conform with the requirements of the Clean Air Act' and Mr. Frederick Bell dealt with 'Unusual Engineering Problems encountered in the Laying of Gas Pipelines.'

Mr. Welch drew on his wide experience as New Buildings Officer of the Division responsible for Harlow New Town (Eastern Gas Board) while Mr. Bell illustrated his paper with examples culled from his experience as Distribution Engineer of the Southern Gas Board.

Clean conditions pipeline shop at Tollcross works

STEWARTS AND LLOYDS LTD., Europe's largest manufacturers of steel tubes, have recently formed a Pipework Engineering Division to concentrate on the fabrication and manipulation of various types of products from tube.

Recently an order was accepted for 424 control rod standpipes for a nuclear reactor. An important requirement of all reactor components is that they must be scrupulously clean because certain elements in dirt or dust particles could damp down the reaction and could also become radioactive. To achieve this high degree of cleanliness, Stewarts and Lloyds constructed at their Tollcross works an impressive 'clean shop'.

Individual parts are degreased, shot-blasted and vacuum-cleaned before entering the clean shop where they are further vacuum-cleaned and dipped in a special protective liquid to prevent rusting. The parts are then assembled in the clean shop, which is of dust-proof construction and decorated with special paints, free from constituents which might contaminate the products. Electrically heated and highly filtered air is supplied under pressure. Personnel enter through a changing room and wear special white overalls, caps, gloves and rubber boots.

IT'S A NATURAL

PROSPECTS for natural gas appear exceptionally good, and its part in supplying Europe's future gas needs is likely to be important, according to the 1960 report of the O.E.E.C. Gas Committee.

The committee does not expect natural gas to revolutionise the energy balance sheet of O.E.E.C. countries since it still accounts for a relatively small proportion of total energy consumption—6.8 % of their total requirements in 1958, says the Paris Correspondent of the Financial Times. *But between now and 1965 the annual increase in demand is expected to average 4.5 to 5.5%.*

NEWS SUPPLEMENT

State studies pipeline policy

APPROPRIATE TIME FOR NEW THOUGHT —MINISTER

NEW policy for the co-ordination of pipeline development in the U.K., along with proposals for new legislation, are now under Government consideration, Lord Mills, Postmaster-General, has disclosed in the Lords.

The Esso Petroleum Company Bill for the laying of two 75-miles long pipelines from Fawley may be the last such measure under the present Private Bill procedure says the *Financial Times* Parliamentary correspondent.

Stressing the national importance of the Esso Bill, and the need for it to proceed quickly through Parliament, Lord Mills made it clear that the general development of pipelines now called for new thinking.

In this light—and with a Government examination of the problem now proceeding with industry—a recently publicised plan for an East London pipeline beginning at Canvey Island will not be countenanced by the Government, 'at least for the present,' said Lord Mills.

There were no other immediate projects in sight for pipelines sponsored either by oil companies or chemical manufacturers, and the Paymaster-General made it plain the Government felt this was an appropriate time for policy-making.

The Bill was given an unopposed Second Reading, and will now be considered by a Select Committee.

But Lord Mills promised that other suggestions from Lord Lucan and other speakers on the future development of pipelines would be considered by the Minister of Power.

Credit Balance

THE credit balance of 77.209 mill. old francs announced by Gaz de France and quoted on p. 265 of our issue of November 9, should have been shown as equivalent to £56,000, not £5.6 mill., as this latter figure was calculated on new francs.

EAST LONDON SYSTEM?

THE East London plan is contained in an announcement that a new public company, Trunk Pipelines Ltd., is to be formed shortly for the purpose of building a pipeline system from Canvey Island to Denham with spurs to Purfleet, Fulham and Wandsworth, and London Airport.

The first stage of the project, which involves 72 miles of pipeline, is expected to cost rather more than £1.5m.

The route from Canvey Island to Denham has necessitated the co-operation of three main authorities, the North Thames Gas Board, the London County Council and the British Transport Commission.

They did 'a wonderful job of work'

CONGRATULATIONS were expressed in the House of Commons to the South Western Gas Board by the Parliamentary Secretary to the Ministry of Power, Mr. J. C. George, and by Mr. C. Loughlin, M.P.

Mr. George was referring to the recent mishap affecting the supply of gas to the Forest of Dean area to which reference has already been made in the 'GAS JOURNAL'.

He said: 'I think that the South Western Gas Board is to be congratulated on the speed with which it has acted to alleviate hardship, restore supplies and avert potential danger, following a quite unforeseeable emergency.'

Mr. Loughlin said that they in the Forest of Dean were very conscious of the debt which they owed to the South Western Gas Board for the way it had dealt with this situation.

The Board had dealt with the matter almost as a wartime emergency and did a wonderful job of work and all that possibly could be done in the circumstances.

GAS WILL BE DEARER IN THE SOUTH-WEST

THE South Western Gas Board, which has, overall, held gas prices at their present level since July 1957 is now raising the price of gas owing to recent major increases in operational costs.

The increased costs are mainly in respect of recent wage and salary awards, the implementation of a 42-hour week, the net effect of the increase in the price of coal, with other ancillary price increases, all of which amount to about £1 mill. in a full year.

The Board, in a statement, expresses confidence that with the further benefits arising from recent integration of works and other planned improvements in efficiency and productivity it can absorb a portion of this increase in its costs and also recover the comparatively small financial loss incurred up to March 31, 1960.

The new tariffs which are, therefore, designed only to recover part of the increased costs will result in the average domestic consumer paying between 4d. and 6d. per week more, and the majority of non-domestic consumers will be charged 1d. to 2d. per therm more than at present.

The price increases will take effect from all meter readings taken on and after Monday, December 5, 1960.

The recent increases in wages and salaries and ancillary charges also affect the cost of consumer service.

More gas by sea— it's l.p.g.

BULK transport by sea of most products will nearly always be more practical and economical than by rail or truck on land. It is becoming even more so now that the roads in most countries of modern Europe—with which is included the British Isles—are often congested by heavy traffic.

It is not difficult to conclude from this that bulk transport by sea of hazardous products like l.p.g. will before long be a must, wherever such transport is feasible and wherever it is needed.

There is nothing new about all this for the Danish firm of Kosangas, Copenhagen, who operate a fleet of special tankers similar to the one shown in the accompanying photograph.

In addition to their extensive trade in Europe, they are also actively supplying the gas industry in the Channel Islands, Eire and Northern Ireland.

The bulk installation at St. Peter Port, Guernsey, supplies the Guernsey gas works with butane.

From butane

It will be recalled that the Guernsey Gas Light Co. Ltd. recently opened a Simon-Carves Otto catalytic reformation plant, when reference was made to Kosangas. The plant produces gas from butane, which is obtained from the Danish firm, and comes by direct pipeline from St. Sampson's harbour to the company's bulk storage plant.

The total importation of l.p.g. into Denmark for 1960 has been 85,000-90,000 tons, the principal suppliers being Sweden, Germany, Holland and France with smaller quantities from Czechoslovakia and Poland. Approximately 93% of all Danish families cook with gas. Town gas is available through pipelines to 900,000 of Denmark's 1,400,000 families, while 400,000 additional families, living beyond the mains, enjoy the convenience of gas cooking, thanks to the l.p.g. distributors.

A pioneer

Not only was Kosangas the pioneer in the l.p.g. business of Denmark, but the company was already established selling compressed coal gas for households in the neighbourhood of the small town of Nyköbing before l.p.g. was introduced into the country.

Utility gas has up until the past few years been coal gas, but the price of coal has been rising and the price of the by-product coke has been declining.

The utility companies were thus caught in a squeeze and began to convert to l.p.g.-air systems.

All six of the Kosangas plants are located on tide water so that they may receive shipments of gas either by special tank ship or by tank truck at refineries not located on salt water terminals.

A Kosangas l.p.g. tanker.

The Company operates its own fleet of tank trucks and has several special ships for transporting l.p.g. by sea.

The Company's first tanker, the motorship Kosangas, was converted from a normal cargo ship by the installation of vertical tanks.

This ship is used in strictly coastal service, but others are sea-going and are at present trading across the Baltic and the North Sea.

Their principal use is in serving the affiliated companies in Sweden, Finland, northern Germany, Eire, northern Ireland, and the Channel Islands.

GAS COUNCIL PLAYERS REVIVE THE 'SAILOR'

FOR their latest production, the Gas Council Dramatic Society selected a play that is by no means easy to produce, depending as it does on the pace of the performance. Their choice was 'Sailor Beware,' of that genre of farce that has become a permanent feature of the English stage.

The central figure of the piece, Emma Hornett, was ably played by Peggy Clarke, who, it was later revealed, was competing against loss of voice; this was, however, by no means apparent from her performance as the hair-raising harridan.

Her meek, fully subjugated husband was played by Denis Scott-Wilson, with the air of the ferrets in whom he found consolation. The two romantic leads were played by Jean Elwood and Eric Kerr, who injected moments of peace into the stormy atmosphere.

The terrified Edie was played by Winifred Fraser, who continually burst into realistic wails at the thought of the impending marriage, which reminded her of her only trip to the altar, when there was, unfortunately, no groom awaiting her.

The flirtatious Daphne Pink was played with charming relish by Alison Scott-Wilson, who attempted, successfully, to vamp the Scot, Carnoustie Bligh, played with a very heavy and effective accent, by John Edwards, who gave a convincing performance as surely the most shy sailor that ever lived.

Mary Duggan gave hilarious vulgarity to Mrs. Lack, the neighbour, and missed none of the nuances that her part allowed her. The hearty, very stagy parson was given a dizzy, reckless approach by Frank Edwards.

The production was lively and successful. What it lacked was punch, by no means easy to attain in a play of this type.—**A. E. D.**

Sasol to spend £3½m. more

SASOL, the world's largest oil-from-coal plant, which is in S. Africa, is spending another £3½ mill. on developments to increase and speed the production of its goods, according to managing director P. E. Rousseau, whose announcement follows the news earlier that Sasol declared its first profit, produced from a turnover of £8,197,000, for the financial year 1959-60.

The new development scheme will be financed partly out of income, and should be completed towards the middle of next year. It will round off the first phase of Sasol's development for which the capital allocation has been £48 mill.

Council approves tower plans

ESTON (Yorkshire) Urban Council has approved plans for a quenching tower for the proposed new coke-ovens to be built at Station Road, South Bank-on-Tees, for the South Durham Steel and Iron Co. Ltd.

Councillor J. E. Green said it was outrageous that the proposed ovens were to be built on a site only 80 yards from houses, but Councillor Herlinshaw, chairman of the Council, said that although the Council had opposed the Scheme, a public inquiry had been held, and the project had received Ministry sanction. There was nothing more the Council could do.

'DYNAMIC' OIL SALES DRIVE CAUSED GLOOM

AT the 62nd Annual General Meeting of the Manchester District Junior Association of Gas Engineers, the newly-elected President, Mr. J. A. Taylor, in his Presidential Address, referred to the periods of gloom and despondency caused by the dynamic sales drive of the oil industry and the reputed zero cost of manufacture of electricity by atomic energy.

The effect on the gas industry had been to make it streamline its methods of operation, examine new methods of obtaining gas, and improve the sales drive. He continued by saying that although they had a long way to go there were signs that their more dynamic advertising and their warm air heating systems were really getting across to the consumer.

When a junior was told by an outsider that he was entering an antiquated industry, he could refer to experiments with hydrogenation, high pressure gasification, the importing of methane and the drilling for natural gas. He could say with pride that the gas industry had a most progressive attitude.

Of the members who had gained awards, the Institution of Gas Engineers Bronze Medal for 1959 was won by Mr. J. R. Teale for his paper 'Clearing the Air.' The North Western Gas Board's Silver Medal was awarded to Mr. H. Crompton for his paper 'Some Applications of Statistics to the Gas Industry.' Mr. F. S. Gray won the Society of British Gas Industries Silver Medal for 1959 with his paper on 'Commissioning of Intermittent Vertical Chamber Ovens'. 'The Design and Operation of an Automatic Distribution Station' won for its author, Mr. W. Moorcroft, the Col. W. M. Carr Memorial Prize. The F. Johnston Prize was won by Mr. Barry Evans with his paper 'Warm Air House Heating.'

I.G.U. now has 20-nation membership

THE Council of the International Gas Union has met in Copenhagen, at the invitation of the Danish Gas Association. The President of the Union (Mr. B. M. Nilsson) was in the chair, with Mr. R. H. Touwaide (General Secretary) in attendance.

Those present included the representatives of the national gas associations of Austria, Belgium, Czechoslovakia, Denmark, France, Great Britain, Holland, Italy, Norway, Rumania, Spain, Sweden, Switzerland, the U.S.S.R. and Western Germany. Mr. R. Jakobsen (President of the Danish Gas Association) welcomed the Council.

The Polish Gas Association was admitted to membership of the Union, making a total membership of 20 national associations.

Progress reports were received of the work of the technical committees and it was stated that the multi-lingual vocabulary would soon be published.

The Council considered the detailed arrangements for the 8th International Gas Conference, to be held in Stockholm in June, 1961, at which more than 50 reports and papers will be presented and discussed.

The members of the Council were received officially in the Town Hall by the Mayor of Copenhagen. They also paid an interesting visit to the refinery gas cracking plant of the municipal gas works.

Pre-packed coke service starts

THE West Midlands Gas Board has started a pre-packed coke service at their Foleshill, Coventry, gasworks to meet a demand for fuel during anticipated shortages this winter.

Customers can now collect 28 lb. bags of coke, pre-packed at a £5,000 plant attached to the retort house. The coke is bagged dry, and costs 3s. 3d. for 28 lb.—making the cost for a cwt. 13s. compared with 9s. 6d. for loose coke.

If the public take to the idea, it may be adopted in the rest of the West Midlands division—and large-scale production would reduce the cost. Stocks are being built up at Board premises at Coventry, Leamington Spa, Warwick, Rugby, Hinckley, Nuneaton, Stratford-on-Avon, and Nuneaton.

DEAL CONCLUDED

Morecambe Corporation, after two years of negotiations, have bought the site of the Moss Lane gasworks from the North Western Gas Board for £9,750.

Orders for two holders

TWO Wiggins dry seal type gasholders, which will be the largest of their type in the United Kingdom, are among recent orders obtained by P.G. Engineering Ltd. (associate of The Power-Gas Corporation Ltd.). The value of these orders, which are for gas storage and gasmaking plant, is over £¾ mill.

At the Clyde Iron Works of Colvilles Ltd., a Wiggins dry seal gasholder with a capacity of 1 mill. cu.ft. is to be installed for the storage of coke oven gas, and a 1 mill. cu.ft. capacity Wiggins is also to be installed for the Wales Gas Board at Rhondda to store town gas.

P.G. Engineering Ltd. has recently received a further contract from the Wales Gas Board. A carburetted water gas plant with a capacity of 3 mill. cu.ft. per day is to be installed at the Board's Maelor Works, Wrexham.

This plant incorporates a mechanical operator with boiler jacket, cyclic coke feed and the reverse flow carburetting system. An electrically operated hydraulic system is incorporated for the cyclic control of the plant valves.

The plant also incorporates equipment to permit the use of p.f.d. and liquid butane for reforming and enriching, in addition to gas oil.

The installation is expected to be completed and ready for operation in November, 1961.

First meeting of new W.G.F. branch

AT the inaugural meeting of the Abercarn and Newbridge Branch of the Women's Gas Federation, the principal guests were the General Secretary, Miss Jessie Frith, O.B.E., and Miss N. Wright, Branch Liaison Officer.

The functions of the Federation in linking the gas industry with the housewives who used gas in their homes was Miss Frith's subject. Mr. J. C. Cotterill, Engineer and Manager, Abercarn Undertaking, explained and demonstrated the Gas Council G.C.2. disabled persons cooker.

During the meeting, Mrs. Carl Thomas was elected President of the branch, and Mrs. W. O. Cotterill was elected Chairman. Mrs. L. M. Strange was elected Secretary, and Mrs. G. M. Rees Treasurer.

U.K. fuel policy is no free-for-all—Minister

THE Government's fuel policy was very different from a free-for-all, said the Hon. Richard Wood, M.P., Minister of Power, at an open meeting of the Women's Gas Federation. The competition between the fuel industries was shaded by consideration of the national interest, and opponents of the Government's fuel policy ignored the constant work of co-ordination carried out by the Ministry. There was close contact between the Ministry and the heads of the nationalised industries, to consider the impact of their industries on the other nationalised industries and on the economy as a whole.

Mr. Wood said: 'I have met an insistent cry that the Government must produce a consistent fuel policy.' This call had from time to time meant entirely different things. It now meant that the Government should give protection to the coal industry.

Effect on exports

Such a policy would involve controlling the 'size and scope of each of the fuel industries', and could only be done by 'telling the consumers which fuel they should use'. Such a policy would be attractive in that it would ensure the fullest possible use being made of home-produced fuels, but it would take away the competitive spur, and be very inconvenient to consumers. It would also cause considerable disability to British industry when competing in export markets.

The Government's fuel policy at the present time aimed to maintain competition among the fuel industries, and freedom for the consumer. Competition was all the more necessary when the industries were monopolies.

Referring to the coal industry, the Minister said: 'In the light of the figures for this year, I can see no justification for pessimism or for restrictive measures.'

There seemed to be a feeling that the gas and electricity industries should not be in competition. Said the Minister, 'I believe competition is good for both industries. They have a place in the framework of a competitive fuel policy.'

Between extremes

'A fuel policy based on dictation by the Government, or on a free-for-all competition would be both repugnant and dangerous. The Government has tried to feel its way between these two extremes. The balance we have achieved is about right for the present conflicting interests.'

Sir Henry Jones, Chairman of the Gas Council, said all their thinking was based on the conception that if people really want to use anything other than gas, they could. 'If we cannot offer a service that people want, as an industry we shall not prosper.'

The future of the gas industry all depended on making gas at the right price. On this subject in relation to importation, Sir Henry said: 'We are now considering whether that can lead to a larger project.'

South Western I.G.E. members elect their officers

THE Annual General Meeting of the South Western Section of the Institution of Gas Engineers saw the election of the officers for the following year. The President and the Secretary of the Institution, Mr. H. S. Cheetham and Dr. W. T. K. Braunholtz, O.B.E., were present at the meeting, as were Mr. James Carr, O.B.E., Deputy Chairman of the South Western Gas Board, and Mr. L. P. Ingram, M.B.E., Chief Engineer.

Elected the new Chairman was Mr. T. W. Jackson. Mr. R. J. Williams was elected Senior Vice-President, and Mr. T. W. Clapham, Junior Vice-President. Mr. A. C. Rea became District Member of Council, Mr. F. C. Gay, M.B.E., Hon. Secretary, and Mr. T. A. Nicholson, Hon. Treasurer.

New London office of Walker, Crosweller

Earlier this year Walker, Crosweller & Co., Ltd., of Cheltenham moved their London Office from Vernon Place to larger premises at Star House, 16, Great James Street, W.C.1. The installation of a display and demonstration room there has now been completed.

PERSONAL NOTES

MR. G. R. BUCKLEY and MR. C. G. MACKIE, previously assistant managing directors of the Stanton Ironworks Co., Ltd., near Nottingham, have been appointed joint Deputy Managing Directors of the Company. MR. E. M. SUMMERS, MR. L. RAWLINS and MR. C. H. WILSON have been appointed Directors.

MR. C. H. BAILEY, of Falk Stadelman and Co. Ltd., has been 70 years with the company. Mr. Bailey joined it at the age of 15 as an office boy, and in 1912 took complete control of B department, which post he held until his official retirement in 1951.

MR. M. P. MURRAY, C.B., has been appointed a Deputy Secretary in the Ministry in succession to SIR REGINALD AYRES, K.B.E., C.B., who will be retiring from the public service on January 2, 1961.

MR. D. M. REES, Chairman of the South Western Division of the National Coal Board since 1952, is to retire early next year for reasons of health. He is 56.

MR. A. H. FLETCHER has been appointed Sales Manager, Geon P.V.C. resins and latices.

MR. JAMES DOW, left, coal and by-products officer, Scottish Gas Board, who has been appointed Gas Engineer and Manager of Belfast Gas Department, receiving a mini projector from Mr. Sydney Smith, the Board's Chairman, at the Board's headquarters in Edinburgh. The projector was presented on behalf of the staff and colleagues.

FORTHCOMING EVENTS

December 8.—I.G.E., SOUTH WESTERN SECTION: Demonstration Theatre, Gas Showrooms, Radiant House, Bristol. 'Recent Industrial Gas Development in the South West,' by K. G. Eccleshare, followed by visit to the Filton Works of Bristol Siddeley Engines Ltd. 11 a.m.

December 8.—WALES AND MONMOUTHSHIRE JUNIORS, NORTH WALES SECTION: Bangor. Talk by D. F. Fisher.

December 8. — MANCHESTER DISTRICT JUNIORS: Town Hall, Manchester. Short Papers for F. Johnston Prize.

December 9.—LONDON AND SOUTHERN JUNIORS: 'The Production of Gloco and Maintenance of its Quality,' by B. L. J. Neal and V. Iutz.

December 10. — YORKSHIRE JUNIORS: Leeds. 'Modern Trends in Gas Purification,' by J. J. Priestley and W. Bouch.

December 14.—LONDON AND SOUTHERN JUNIORS: Visit to the L.C.C. Northern Outfall Works, Beckton.